

# Health Technologists, Technicians, and Healthcare Support Occupations



Reprinted from the  
Occupational Outlook Handbook, 2002-03 Edition

U.S. Department of Labor  
Bureau of Labor Statistics

February 2002

Bulletin 2540-9



## Occupations Included in this Reprint

Cardiovascular technologists and technicians  
Clinical laboratory technologists and technicians  
Dental assistants  
Dental hygienists  
Dental laboratory technicians  
Diagnostic medical sonographers  
Emergency medical technicians and paramedics  
Licensed practical and licensed vocational nurses  
Medical assistants  
Medical records and health information technicians  
Medical transcriptionists  
Nuclear medicine technologists  
Nursing, psychiatric, and home health aides  
Occupational health and safety specialists and technicians  
Occupational therapist assistants and aides  
Ophthalmic laboratory technicians  
Opticians, dispensing  
Pharmacy aides  
Pharmacy technicians  
Physical therapist assistants and aides  
Radiologic technologists and technicians  
Surgical technologists

# Cardiovascular Technologists and Technicians

(O\*NET 29-2031.00)

## Significant Points

- Employment will grow faster than the average, but the number of job openings created will be low, because the occupation is small.
- Job prospects will be good due to an aging population and increased need for vascular technology and sonography as an alternative for more costly and invasive heart surgery.
- About 7 out of 10 jobs are in hospitals, in both inpatient and outpatient settings.

## Nature of the Work

Cardiovascular technologists and technicians assist physicians in diagnosing and treating cardiac (heart) and peripheral vascular (blood vessel) ailments. Cardiovascular technologists may specialize in three areas of practice: Invasive cardiology, echocardiography, and vascular technology. Cardiovascular technicians who specialize in electrocardiograms (EKGs), stress testing, and Holter monitors are known as *cardiographic* or *EKG technicians*.

Cardiovascular technologists specializing in invasive procedures are called *cardiology technologists*. They assist physicians with cardiac catheterization procedures in which a small tube, or catheter, is wound through a patient's blood vessel from a spot on the patient's leg into the heart. The procedure can determine if a blockage exists in the blood vessels that supply the heart muscle and help diagnose other problems. Part of the procedure may involve balloon angioplasty, which can be used to treat blockages of blood vessels or heart valves, without the need for heart surgery. Cardiology technologists assist physicians as they insert a catheter with a balloon on the end to the point of the obstruction.

Technologists prepare patients for cardiac catheterization and balloon angioplasty by first positioning them on an examining table and then shaving, cleaning, and administering anesthesia to the top of the patient's leg near the groin. During the procedures, they monitor patients' blood pressure and heart rate using EKG equipment and notify the physician if something appears wrong. Technologists also may prepare and monitor patients during open-heart surgery and the implantation of pacemakers.

Cardiovascular technologists who specialize in echocardiography or vascular technology often run noninvasive tests using ultrasound instrumentation, such as doppler ultrasound. Tests are called "noninvasive" if they do not require the insertion of probes or other instruments into the patient's body. The ultrasound instrumentation transmits high frequency sound waves into areas of the patient's body and then processes reflected echoes of the sound waves to form an image. Technologists view the ultrasound image on a screen that may be recorded on videotape or photographed for interpretation and diagnosis by a physician. While performing the scan, technologists check the image on the screen for subtle differences between healthy and diseased areas, decide which images to include, and judge if the images are satisfactory for diagnostic purposes. They also explain the procedure to patients, record additional medical history, select appropriate equipment settings, and change the patient's position as necessary. (See the statement on diagnostic medical sonographers elsewhere in the *Handbook* to learn more about other sonographers.)

Those who assist physicians in the diagnosis of disorders affecting circulation are known as *vascular technologists* or *vascular sonographers*. They perform a medical history and evaluate pulses by listening to the sounds of the arteries for abnormalities. Then they perform a noninvasive procedure using ultrasound instrumentation to record vascular information, such as vascular blood flow, blood pressure, limb volume changes, oxygen saturation, cerebral circulation, peripheral circulation, and abdominal circulation. Many of these tests are performed during or immediately after surgery.

Technologists who use ultrasound to examine the heart chambers, valves, and vessels are referred to as *cardiac sonographers*, or *echocardiographers*. They use ultrasound instrumentation to create images called echocardiograms. This may be done while the patient is either resting or physically active. Technologists may administer medication to a physically active patient to assess their heart function. Cardiac sonographers may also assist physicians who perform transesophageal echocardiography, which involves placing a tube in the patient's esophagus to obtain ultrasound images.

Cardiovascular technicians who obtain EKGs are known as *electrocardiograph* (or *EKG*) *technicians*. To take a basic EKG, which traces electrical impulses transmitted by the heart, technicians attach electrodes to the patient's chest, arms, and legs, and then manipulate switches on an EKG machine to obtain a reading. A printout is made for interpretation by the physician. This test is done before most kinds of surgery and as part of a routine physical examination, especially for persons who have reached middle age or have a history of cardiovascular problems.



About 7 out of 10 cardiovascular technologists and technicians work in hospitals.

EKG technicians with advanced training perform Holter monitor and stress testing. For Holter monitoring, technicians place electrodes on the patient's chest and attach a portable EKG monitor to the patient's belt. Following 24 or more hours of normal activity for the patient, the technician removes a tape from the monitor and places it in a scanner. After checking the quality of the recorded impulses on an electronic screen, the technician usually prints the information from the tape so that a physician can interpret it later. Physicians use the output from the scanner to diagnose heart ailments, such as heart rhythm abnormalities or problems with pacemakers.

For a treadmill stress test, EKG technicians document the patient's medical history, explain the procedure, connect the patient to an EKG monitor, and obtain a baseline reading and resting blood pressure. Next, they monitor the heart's performance while the patient is walking on a treadmill, gradually increasing the treadmill's speed to observe the effect of increased exertion. Like vascular technologists and cardiac sonographers, cardiographic technicians who perform EKG, Holter monitor, and stress tests are known as "noninvasive" technicians.

Some cardiovascular technologists and technicians schedule appointments, type doctor interpretations, maintain patient files, and care for equipment.

### Working Conditions

Technologists and technicians generally work a 5-day, 40-hour week that may include weekends. Those in catheterization labs tend to work longer hours and may work evenings. They also may be on call during the night and on weekends.

Cardiovascular technologists and technicians spend a lot of time walking and standing. Those who work in catheterization labs may face stressful working conditions, because they are in close contact with patients with serious heart ailments. Some patients, for example, may encounter complications from time to time that have life or death implications.

### Employment

Cardiovascular technologists and technicians held about 39,000 jobs in 2000. Most worked in hospital cardiology departments, whereas some worked in offices of cardiologists or other physicians, cardiac rehabilitation centers, or ambulatory surgery centers.

### Training, Other Qualifications, and Advancement

Although a few cardiovascular technologists, vascular technologists, and cardiac sonographers are currently trained on the job, most receive training in 2- to 4-year programs. Cardiovascular technologists, vascular technologists, and cardiac sonographers normally complete a 2-year junior or community college program. One year is dedicated to core courses followed by a year of specialized instruction in either invasive, noninvasive cardiovascular, or noninvasive vascular technology. Those who are qualified in a related allied health profession only need to complete the year of specialized instruction.

Graduates from the 23 programs accredited by the Joint Review Committee on Education in Cardiovascular Technology are eligible to obtain professional certification through Cardiovascular Credentialing International in cardiac catheterization, echocardiography, vascular ultrasound, and cardiographic techniques. Cardiac sonographers and vascular technologists may also obtain certification with the American Registry of Diagnostic Medical Sonographers.

For basic EKGs, Holter monitoring, and stress testing, 1-year certificate programs exist; but most EKG technicians are still trained on the job by an EKG supervisor or a cardiologist. On-the-job

training usually lasts about 8 to 16 weeks. Most employers prefer to train people already in the health care field—nursing aides, for example. Some EKG technicians are students enrolled in 2-year programs to become technologists, working part-time to gain experience and make contact with employers.

Cardiovascular technologists and technicians must be reliable, have mechanical aptitude, and be able to follow detailed instructions. A pleasant, relaxed manner for putting patients at ease is an asset.

### Job Outlook

Employment of cardiovascular technologists and technicians is expected to grow faster than the average for all occupations through the year 2010. Growth will occur as the population ages, because older people have a higher incidence of heart problems. Employment of *vascular technologists* and *echocardiographers* will grow as advances in vascular technology and sonography reduce the need for more costly and invasive procedures. Employment of *EKG technicians* is expected to decline, as hospitals train nursing aides and others to perform basic EKG procedures. Individuals trained in Holter monitoring and stress testing are expected to have more favorable job prospects than those who can only perform a basic EKG.

Some job openings for cardiovascular technologists and technicians will arise from replacement needs, as individuals transfer to other jobs or leave the labor force. Relatively few job openings, due to both growth and replacement needs are expected, however, because the occupation is small.

### Earnings

Median annual earnings of cardiovascular technologists and technicians were \$33,350 in 2000. The middle 50 percent earned between \$24,590 and \$43,450. The lowest 10 percent earned less than \$19,540, and the highest 10 percent earned more than \$52,930. Median annual earnings of cardiovascular technologists and technicians in 2000 were \$33,100 in offices and clinics of medical doctors and \$32,860 in hospitals.

### Related Occupations

Cardiovascular technologists and technicians operate sophisticated equipment that helps physicians and other health practitioners diagnose and treat patients. So do diagnostic medical sonographers, nuclear medicine technologists, radiation therapists, radiologic technologists and technicians, and respiratory therapists.

### Sources of Additional Information

For general information about a career in cardiovascular technology, contact:

► Alliance of Cardiovascular Professionals, 4456 Corporation Ln., Suite 165, Virginia Beach, VA 23462. Internet: <http://www.acp-online.org/index.html>

For a list of accredited programs in cardiovascular technology, contact:

► Joint Review Committee on Education in Cardiovascular Technology, 3525 Ellicott Mills Dr., Suite N, Ellicott City, MD 21043-4547. Internet: <http://www.sicp.com/jrc-cvt>

For information on vascular technology, contact:

► The Society of Vascular Technology, 4601 Presidents Dr., Suite 260, Lanham, MD 20706-4365. Internet: <http://www.svtnet.org>

For information on echocardiography, contact:

► American Society of Echocardiography, 4101 Lake Boone Trail, Suite 201, Raleigh, NC 27607. Internet: <http://www.asecho.org>

For information regarding registration and certification, contact:

## Clinical Laboratory Technologists and Technicians

(O\*NET 29-2011.00, 29-2012.00)

### Significant Points

- Clinical laboratory technologists usually have a bachelor's degree with a major in medical technology or in one of the life sciences; clinical laboratory technicians need either an associate's degree or a certificate.
- Employment is expected to grow as fast as average as the volume of laboratory tests increases with population growth and the development of new types of tests.

### Nature of the Work

Clinical laboratory testing plays a crucial role in the detection, diagnosis, and treatment of disease. Clinical laboratory technologists, also referred to as *clinical laboratory scientists* or *medical technologists*, and clinical laboratory technicians, also known as *medical technicians* or *medical laboratory technicians*, perform most of these tests.

Clinical laboratory personnel examine and analyze body fluids, tissues, and cells. They look for bacteria, parasites, and other microorganisms; analyze the chemical content of fluids; match blood for transfusions; and test for drug levels in the blood to show how a patient is responding to treatment. These technologists also prepare specimens for examination, count cells, and look for abnormal cells. They use automated equipment and instruments capable of performing a number of tests simultaneously, as well as microscopes, cell counters, and other sophisticated laboratory equipment. Then, they analyze the results and relay them to physicians. With increasing automation and the use of computer technology, the work of technologists and technicians has become less hands-on and more analytical.

The complexity of tests performed, the level of judgment needed, and the amount of responsibility workers assume depend largely on the amount of education and experience they have.

*Medical and clinical laboratory technologists* generally have a bachelor's degree in medical technology or in one of the life sciences, or they have a combination of formal training and work experience. They perform complex chemical, biological, hematological, immunologic, microscopic, and bacteriological tests. Technologists microscopically examine blood, tissue, and other body substances. They make cultures of body fluid and tissue samples, to determine the presence of bacteria, fungi, parasites, or other microorganisms. They analyze samples for chemical content or reaction and determine blood glucose and cholesterol levels. They also type and cross match blood samples for transfusions.

Medical and clinical laboratory technologists evaluate test results, develop and modify procedures, and establish and monitor programs, to ensure the accuracy of tests. Some medical and clinical laboratory technologists supervise medical and clinical laboratory technicians.

Technologists in small laboratories perform many types of tests, whereas those in large laboratories generally specialize. Technologists who prepare specimens and analyze the chemical and hormonal



*Laboratory technologists and technicians examine and analyze body fluids, tissues, and cells.*

contents of body fluids are *clinical chemistry technologists*. Those who examine and identify bacteria and other microorganisms are *microbiology technologists*. *Blood bank technologists*, or *immunohematology technologists*, collect, type, and prepare blood and its components for transfusions. *Immunology technologists* examine elements and responses of the human immune system to foreign bodies. *Cytotechnologists* prepare slides of body cells and microscopically examine these cells for abnormalities that may signal the beginning of a cancerous growth. *Molecular biology technologists* perform complex genetic testing on cell samples.

*Medical and clinical laboratory technicians* perform less complex tests and laboratory procedures than technologists. Technicians may prepare specimens and operate automated analyzers, for example, or they may perform manual tests following detailed instructions. Like technologists, they may work in several areas of the clinical laboratory or specialize in just one. *Histology technicians* cut and stain tissue specimens for microscopic examination by pathologists, and *phlebotomists* collect blood samples. They usually work under the supervision of medical and clinical laboratory technologists or laboratory managers.

### Working Conditions

Hours and other working conditions of clinical laboratory technologists and technicians vary, according to the size and type of employment setting. In large hospitals or in independent laboratories that operate continuously, personnel usually work the day, evening,



or night shift and may work weekends and holidays. Laboratory personnel in small facilities may work on rotating shifts, rather than on a regular shift. In some facilities, laboratory personnel are on call several nights a week or on weekends, in case of an emergency.

Clinical laboratory personnel are trained to work with infectious specimens. When proper methods of infection control and sterilization are followed, few hazards exist. Protective masks, gloves, and goggles are often necessary to ensure the safety of laboratory personnel.

Laboratories usually are well-lighted and clean; however, specimens, solutions, and reagents used in the laboratory sometimes produce fumes. Laboratory workers may spend a great deal of time on their feet.

## Employment

Clinical laboratory technologists and technicians held about 295,000 jobs in 2000. About half worked in hospitals. Most of the remaining jobs were found in medical laboratories or offices and clinics of physicians. A small number were in blood banks, research and testing laboratories, and in the Federal Government—at U.S. Department of Veterans Affairs hospitals and U.S. Public Health Service facilities.

## Training, Other Qualifications, and Advancement

The usual requirement for an entry-level position as a medical or clinical laboratory technologist is a bachelor's degree with a major in medical technology or in one of the life sciences. Universities and hospitals offer medical technology programs. It also is possible to qualify through a combination of education, on-the-job, and specialized training.

Bachelor's degree programs in medical technology include courses in chemistry, biological sciences, microbiology, mathematics, statistics, and specialized courses devoted to knowledge and skills used in the clinical laboratory. Many programs also offer or require courses in management, business, and computer applications. The Clinical Laboratory Improvement Act (CLIA) requires technologists who perform certain highly complex tests to have at least an associate's degree.

Medical and clinical laboratory technicians generally have either an associate's degree from a community or junior college or a certificate from a hospital, vocational or technical school, or from one of the U.S. Armed Forces. A few technicians learn their skills on the job.

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) fully accredits 503 programs for medical and clinical laboratory technologists, medical and clinical laboratory technicians, histologic technologists and technicians, and pathologists' assistants. NAACLS also approves 70 programs in phlebotomy, cytogenetic technology, molecular biology, and clinical assisting. Other nationally recognized accrediting agencies include the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and the Accrediting Bureau of Health Education Schools (ABHES).

Some States require laboratory personnel to be licensed or registered. Information on licensure is available from State departments of health or boards of occupational licensing. Certification is a voluntary process by which a nongovernmental organization, such as a professional society or certifying agency, grants recognition to an individual whose professional competence meets prescribed standards. Widely accepted by employers in the health industry, certification is a prerequisite for most jobs and often is necessary for advancement. Agencies certifying medical and clinical laboratory technologists and technicians include the Board of Registry of the American Society for Clinical Pathology, the American

Medical Technologists, the National Credentialing Agency for Laboratory Personnel, and the Board of Registry of the American Association of Bioanalysts. These agencies have different requirements for certification and different organizational sponsors.

Clinical laboratory personnel need good analytical judgment and the ability to work under pressure. Close attention to detail is essential, because small differences or changes in test substances or numerical readouts can be crucial for patient care. Manual dexterity and normal color vision are highly desirable. With the widespread use of automated laboratory equipment, computer skills are important. In addition, technologists in particular are expected to be good at problem solving.

Technologists may advance to supervisory positions in laboratory work or become chief medical or clinical laboratory technologists or laboratory managers in hospitals. Manufacturers of home diagnostic testing kits and laboratory equipment and supplies seek experienced technologists to work in product development, marketing, and sales. Graduate education in medical technology, one of the biological sciences, chemistry, management, or education usually speeds advancement. A doctorate is needed to become a laboratory director. However, federal regulation allows directors of moderate complexity laboratories to have either a master's degree or a bachelor's degree combined with the appropriate amount of training and experience. Technicians can become technologists through additional education and experience.

## Job Outlook

Employment of clinical laboratory workers is expected to grow about as fast as the average for all occupations through the year 2010, as the volume of laboratory tests increases with population growth and the development of new types of tests.

Technological advances will continue to have two opposing effects on employment through 2010. New, increasingly powerful diagnostic tests will encourage additional testing and spur employment. On the other hand, research and development efforts targeted at simplifying routine testing procedures may enhance the ability of nonlaboratory personnel, physicians and patients, in particular, to perform tests now done in laboratories.

Although significant, growth will not be the only source of opportunities. As in most occupations, many openings will result from the need to replace workers who transfer to other occupations, retire, or stop working for some other reason.

## Earnings

Median annual earnings of medical and clinical laboratory technologists were \$40,510 in 2000. The middle 50 percent earned between \$34,220 and \$47,460. The lowest 10 percent earned less than \$29,240, and the highest 10 percent earned more than \$55,560. Median annual earnings in the industries employing the largest numbers of medical and clinical laboratory technologists in 2000 were as follows:

Hospitals .....	\$40,840
Medical and dental laboratories .....	39,780
Offices and clinics of medical doctors .....	38,850

Median annual earnings of medical and clinical laboratory technicians were \$27,540 in 2000. The middle 50 percent earned between \$22,260 and \$34,320. The lowest 10 percent earned less than \$18,550, and the highest 10 percent earned more than \$42,370. Median annual earnings in the industries employing the largest numbers of medical and clinical laboratory technicians in 2000 were as follows:

Hospitals .....	\$28,860
Colleges and universities .....	27,810
Offices and clinics of medical doctors .....	27,180
Medical and dental laboratories .....	25,250
Health and allied health services, not elsewhere classified .....	24,370

According to the American Society for Clinical Pathology, median hourly pay of staff clinical laboratory technologists and technicians in 2000 varied by specialty as follows:

	<i>Beginning</i>	<i>Average</i>	<i>Top</i>
Cytotechnologist .....	\$16.70	\$21.30	\$24.00
Histotechnologist .....	13.90	18.00	19.90
Medical technologist .....	14.00	17.90	20.50
Histologic technician .....	12.00	15.30	17.30
Medical laboratory technician .....	11.40	14.00	16.30
Phlebotomist .....	8.10	9.90	11.80

### Related Occupations

Clinical laboratory technologists and technicians analyze body fluids, tissue, and other substances using a variety of tests. Similar or related procedures are performed by chemists and material scientists, science technicians, and veterinary technologists, technicians, and assistants.

### Sources of Additional Information

For a list of accredited and approved educational programs for clinical laboratory personnel, contact:

➤ National Accrediting Agency for Clinical Laboratory Sciences, 8410 W. Bryn Mawr Ave., Suite 670, Chicago, IL 60631. Internet: <http://www.naacls.org>

Information on certification is available from:

➤ American Association of Bioanalysts, 917 Locust St., Suite 1100, St. Louis, MO 63101. Internet: <http://www.aab.org>  
 ➤ American Medical Technologists, 710 Higgins Rd., Park Ridge, IL 60068. Internet: <http://www.amt1.com>  
 ➤ American Society for Clinical Pathology, Board of Registry, 2100 West Harrison St., Chicago, IL 60612. Internet: <http://www.ascp.org/bor>  
 ➤ National Credentialing Agency for Laboratory Personnel, P.O. Box 15945-289, Lenexa, KS 66285-5935. Internet: <http://www.nca-info.org>

Additional career information is available from:

➤ American Association of Blood Banks, 8101 Glenbrook Rd., Bethesda, MD 20814-2749. Internet: <http://www.aabb.org>  
 ➤ American Society for Clinical Laboratory Science, 7910 Woodmont Ave., Suite 530, Bethesda, MD 20814. Internet: <http://www.ascls.org>  
 ➤ American Society for Clinical Pathology, 2100 West Harrison St., Chicago, IL 60612. Internet: <http://www.ascp.org>

## Dental Assistants

(O\*NET 31-9091.00)

### Significant Points

- Rapid employment growth and substantial replacement needs should result in good job opportunities.
- Dentists are expected to hire more assistants to perform routine tasks so that they may devote their own time to more profitable procedures.
- Infection control is a crucial responsibility of dental assistants. Proper infection control protects patients and members of the dental health team.

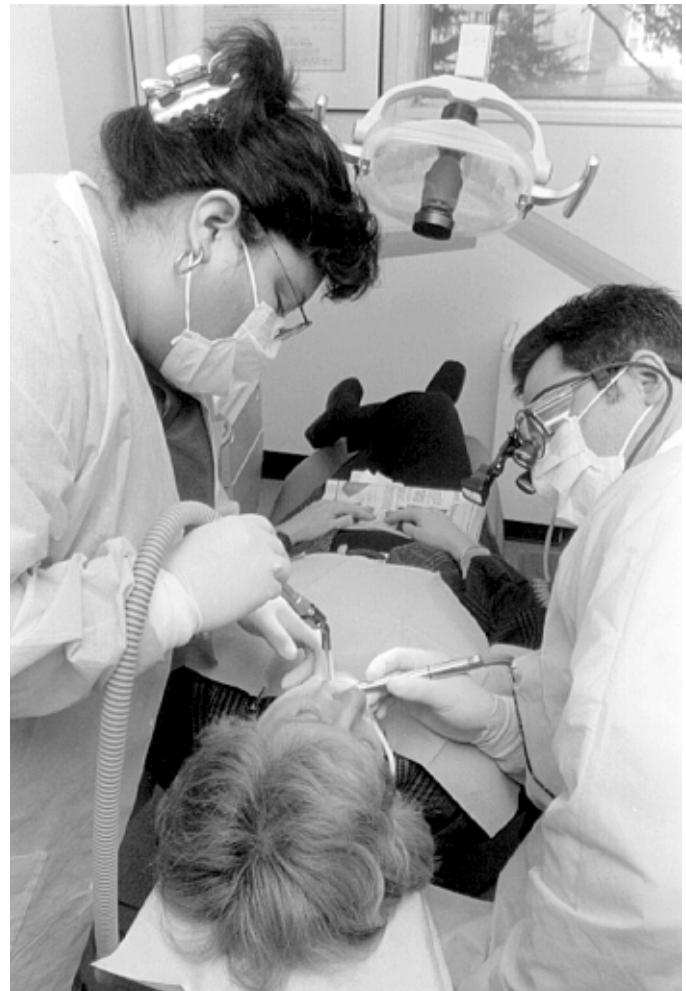
### Nature of the Work

Dental assistants perform a variety of patient care, office, and laboratory duties. They work chairside as dentists examine and treat patients. They make patients as comfortable as possible in the dental chair, prepare them for treatment, and obtain dental records. Assistants hand instruments and materials to dentists, and keep patients' mouths dry and clear by using suction or other devices. Assistants also sterilize and disinfect instruments and equipment, prepare tray setups for dental procedures, and instruct patients on postoperative and general oral health care.

Some dental assistants prepare materials for making impressions and restorations, expose radiographs, and process dental x-ray film as directed by a dentist. They also may remove sutures, apply anesthetics to gums or cavity-preventive agents to teeth, remove excess cement used in the filling process, and place rubber dams on the teeth to isolate them for individual treatment.

Those with laboratory duties make casts of the teeth and mouth from impressions taken by dentists, clean and polish removable appliances, and make temporary crowns. Dental assistants with office duties schedule and confirm appointments, receive patients, keep treatment records, send bills, receive payments, and order dental supplies and materials.

Dental assistants should not be confused with dental hygienists, who are licensed to perform different clinical tasks. (See the statement on dental hygienists elsewhere in the *Handbook*.)



*Dental assistants hand instruments and materials to dentists and keep patients' mouths dry and clear.*

## Working Conditions

Dental assistants work in a well-lighted, clean environment. Their work area usually is near the dental chair so that they can arrange instruments, materials, and medication and hand them to the dentist when needed. Dental assistants wear gloves, masks, eyewear, and protective clothing to protect themselves and their patients from infectious diseases. Following safety procedures also minimizes the risks associated with the use of radiographic equipment.

Almost half of dental assistants have a 35- to 40-hour work-week, which may include work on Saturdays or evenings.

## Employment

Dental assistants held about 247,000 jobs in 2000. Almost 2 out of 5 worked part time, sometimes in more than one dental office.

Virtually all dental assistants work in a private dental office. A small number work in dental schools, private and government hospitals, State and local public health departments, or clinics.

## Training, Other Qualifications, and Advancement

Most assistants learn their skills on the job, though some are trained in dental assisting programs offered by community and junior colleges, trade schools, technical institutes, or the Armed Forces. Assistants must be a dentist's "third hand"; therefore, dentists look for people who are reliable, can work well with others, and have good manual dexterity. High school students interested in a career as a dental assistant should take courses in biology, chemistry, health, and office practices.

The American Dental Association's Commission on Dental Accreditation approved 248 dental assisting training programs in 2000. Programs include classroom, laboratory, and preclinical instruction in dental assisting skills and related theory. In addition, students gain practical experience in dental schools, clinics, or dental offices. Most programs take 1 year or less to complete and lead to a certificate or diploma. Two-year programs offered in community and junior colleges lead to an associate degree. All programs require a high school diploma or its equivalent, and some require a typing or science course for admission. Some private vocational schools offer 4- to 6-month courses in dental assisting, but the Commission on Dental Accreditation does not accredit these.

Some States regulate the duties dental assistants may complete through licensure or registration. Licensure or registration may require passing a written or practical examination. States offering licensure or registration have a variety of schools offering courses—approximately 10 to 12 months in length—that meet their State's requirements. Some States require continuing education to maintain licensure or registration. A few States allow dental assistants to perform any function delegated to them by the dentist.

Individual States have adopted different standards for dental assistants who perform certain medical duties, such as radiological procedures. Completion of the Radiation Health and Safety examination offered by the Dental Assisting National Board, Inc. (DANB) meets those standards in 31 States. Some States require the completion of a State-approved course in radiology as well.

Certification is available through DANB and is recognized or required in 20 States. Other organizations offer registration, most often at the State level. Certification is an acknowledgment of an assistant's qualifications and professional competence, and may be an asset when seeking employment. Candidates may qualify to take the DANB certification examination by graduating from an accredited training program or by having 2 years of full-time, or 4 years of part-time, experience as a dental assistant. In addition, applicants

must have current certification in cardiopulmonary resuscitation. Recertification is offered annually for applicants who have earned continuing education credits.

Without further education, advancement opportunities are limited. Some dental assistants become office managers, dental assisting instructors, or dental product sales representatives. Others go back to school to become dental hygienists. For many, this entry-level occupation provides basic training and experience and serves as a steppingstone to more highly skilled and higher paying jobs.

## Job Outlook

Job prospects for dental assistants should be good. Employment is expected to grow much faster than the average for all occupations through the year 2010. In addition, numerous job openings will occur due to the need to replace assistants who transfer to other occupations, retire, or leave the labor force for other reasons. Many opportunities are for entry-level positions offering on-the-job training.

Population growth and greater retention of natural teeth by middle-aged and older people will fuel demand for dental services. Older dentists, who are less likely to employ assistants, will leave and be replaced by recent graduates, who are more likely to use one, or even two. In addition, as dentists' workloads increase, they are expected to hire more assistants to perform routine tasks, so that they may devote their own time to more profitable procedures.

## Earnings

Median hourly earnings of dental assistants were \$12.49 in 2000. The middle 50 percent earned between \$9.99 and \$15.51 an hour. The lowest 10 percent earned less than \$8.26, and the highest 10 percent earned more than \$18.57 an hour.

Benefits vary substantially by practice setting and may be contingent upon full-time employment. According to the American Dental Association's 1999 Workforce Needs Assessment Survey, almost all full-time dental assistants employed by private practitioners received paid vacation. The survey also found that 9 out of 10 full- and part-time dental assistants received dental coverage.

## Related Occupations

Workers in other occupations supporting health practitioners include medical assistants, occupational therapist assistants and aides, pharmacy aides, pharmacy technicians, physical therapist assistants and aides, and veterinary technologists, technicians, and assistants.

## Sources of Additional Information

Information about career opportunities and accredited dental assistant programs is available from:

► Commission on Dental Accreditation, American Dental Association, 211 E. Chicago Ave., Suite 1814, Chicago, IL 60611. Internet: <http://www.ada.org>

For information on becoming a Certified Dental Assistant and a list of State boards of dentistry, contact:

► Dental Assisting National Board, Inc., 676 North Saint Clair, Suite 1880, Chicago, IL 60611. Internet: <http://www.danb.org>

For general information about continuing education for dental assistants, contact:

► American Dental Assistants Association, 203 North LaSalle St., Suite 1320, Chicago, IL 60601. Internet: <http://www.dentalassistant.org>

# Dental Hygienists

(O\*NET 29-2021.00)

## Significant Points

- Dental hygienists are projected to be one of the 30 fastest growing occupations.
- Population growth and greater retention of natural teeth will stimulate demand for dental hygienists.
- Opportunities for part-time work and flexible schedules are common.

## Nature of the Work

Dental hygienists remove soft and hard deposits from teeth, teach patients how to practice good oral hygiene, and provide other preventive dental care. Hygienists examine patients' teeth and gums, recording the presence of diseases or abnormalities. They remove calculus, stains, and plaque from teeth; take and develop dental x rays; and apply cavity-preventive agents such as fluorides and pit and fissure sealants. In some States, hygienists administer anesthetics; place and carve filling materials, temporary fillings, and periodontal dressings; remove sutures; perform root-planing as a periodontal therapy; and smooth and polish metal restorations. Although hygienists may not diagnose diseases, they can prepare clinical and laboratory diagnostic tests for the dentist to interpret. Hygienists sometimes work chairside with the dentist during treatment.

Dental hygienists also help patients develop and maintain good oral health. For example, they may explain the relationship between diet and oral health, or even the link between oral health and such serious conditions as heart disease and stroke. They also inform patients how to select toothbrushes and show them how to brush and floss their teeth.

Dental hygienists use hand and rotary instruments and ultrasonics to clean and polish teeth, x-ray machines to take dental pictures, syringes with needles to administer local anesthetics, and models of teeth to explain oral hygiene.

## Working Conditions

Flexible scheduling is a distinctive feature of this job. Full-time, part-time, evening, and weekend schedules are widely available. Dentists frequently hire hygienists to work only 2 or 3 days a week, so hygienists may hold jobs in more than one dental office.



*Hygienists clean and examine teeth and gums, noting the presence of diseases or abnormalities.*

Dental hygienists work in clean, well-lighted offices. Important health safeguards include strict adherence to proper radiological procedures, and use of appropriate protective devices when administering anesthetic gas. Dental hygienists also wear safety glasses, surgical masks, and gloves to protect themselves from infectious diseases.

## Employment

Dental hygienists held about 147,000 jobs in 2000. Because multiple jobholding is common in this field, the number of jobs exceeds the number of hygienists. More than half of all dental hygienists worked part time—less than 35 hours a week.

Almost all dental hygienists work in private dental offices. Some work in public health agencies, hospitals, and clinics.

## Training, Other Qualifications, and Advancement

Dental hygienists must be licensed by the State in which they practice. To qualify for licensure, a candidate must graduate from an accredited dental hygiene school and pass both a written and clinical examination. The American Dental Association Joint Commission on National Dental Examinations administers the written examination accepted by all States and the District of Columbia. State or regional testing agencies administer the clinical examination. In addition, most States require an examination on legal aspects of dental hygiene practice. Alabama allows candidates to take its examinations if they have been trained through a State-regulated on-the-job program in a dentist's office.

In 2000, the Commission on Dental Accreditation accredited about 256 programs in dental hygiene. Although some programs lead to a bachelor's degree, most grant an associate degree. A dozen universities offer master's degree programs in dental hygiene or a related area.

An associate degree is sufficient for practice in a private dental office. A bachelor's or master's degree usually is required for research, teaching, or clinical practice in public or school health programs.

About half of the dental hygiene programs prefer applicants who have completed at least 1 year of college. However, requirements vary from one school to another. Schools offer laboratory, clinical, and classroom instruction in subjects such as anatomy, physiology, chemistry, microbiology, pharmacology, nutrition, radiography, histology (the study of tissue structure), periodontology (the study of gum diseases), pathology, dental materials, clinical dental hygiene, and social and behavioral sciences.

Dental hygienists should work well with others and must have good manual dexterity because they use dental instruments within a patient's mouth, with little room for error. High school students interested in becoming a dental hygienist should take courses in biology, chemistry, and mathematics.

## Job Outlook

Employment of dental hygienists is expected to grow much faster than the average for all occupations through 2010, in response to increasing demand for dental care and the greater substitution of the services of hygienists for those previously performed by dentists. Job prospects are expected to remain very good unless the number of dental hygienist program graduates grows much faster than during the last decade, and results in a much larger pool of qualified applicants.

Population growth and greater retention of natural teeth will stimulate demand for dental hygienists. Older dentists, who are less likely to employ dental hygienists, will leave and be replaced by recent graduates, who are more likely to do so. In addition, as dentists' workloads increase, they are expected to hire more hygienists to



perform preventive dental care such as cleaning, so that they may devote their own time to more profitable procedures.

### Earnings

Median hourly earnings of dental hygienists were \$24.68 in 2000. The middle 50 percent earned between \$20.46 and \$29.72 an hour. The lowest 10 percent earned less than \$15.53, and the highest 10 percent earned more than \$35.39 an hour.

Earnings vary by geographic location, employment setting, and years of experience. Dental hygienists who work in private dental offices may be paid on an hourly, daily, salary, or commission basis.

Benefits vary substantially by practice setting, and may be contingent upon full-time employment. According to the American Dental Association's 1999 Workforce Needs Assessment Survey, almost all full-time dental hygienists employed by private practitioners received paid vacation. The survey also found that 9 out of 10 full- and part-time dental hygienists received dental coverage. Dental hygienists who work for school systems, public health agencies, the Federal Government, or State agencies usually have substantial benefits.

### Related Occupations

Workers in other occupations supporting health practitioners in an office setting include dental assistants, medical assistants, occupational therapist assistants and aides, physical therapist assistants and aides, physician assistants, and registered nurses.

### Sources of Additional Information

For information on a career in dental hygiene and the educational requirements to enter this occupation, contact:

► Division of Professional Development, American Dental Hygienists' Association, 444 N. Michigan Ave., Suite 3400, Chicago, IL 60611. Internet: <http://www.adha.org>

For information about accredited programs and educational requirements, contact:

► Commission on Dental Accreditation, American Dental Association, 211 E. Chicago Ave., Suite 1814, Chicago, IL 60611. Internet: <http://www.ada.org>

The State Board of Dental Examiners in each State can supply information on licensing requirements.

---

## Dental Laboratory Technicians

---

(O\*NET 51-9081.00)

---

### Significant Points

- Employment should increase slowly, as the public's improving dental health requires fewer dentures but more bridges and crowns.
- Dental laboratory technicians need artistic aptitude for detailed and precise work, a high degree of manual dexterity, and good vision.

### Nature of the Work

Dental laboratory technicians fill prescriptions from dentists for crowns, bridges, dentures, and other dental prosthetics. First, dentists send a specification of the item to be fabricated, along with an impression (mold) of the patient's mouth or teeth. Then, dental laboratory technicians, also called dental technicians, create a model of the patient's mouth by pouring plaster into the impression and allowing it to set. Next, they place the model on an apparatus that mimics the bite and movement of the patient's jaw. The model serves as the basis of the prosthetic device. Technicians examine

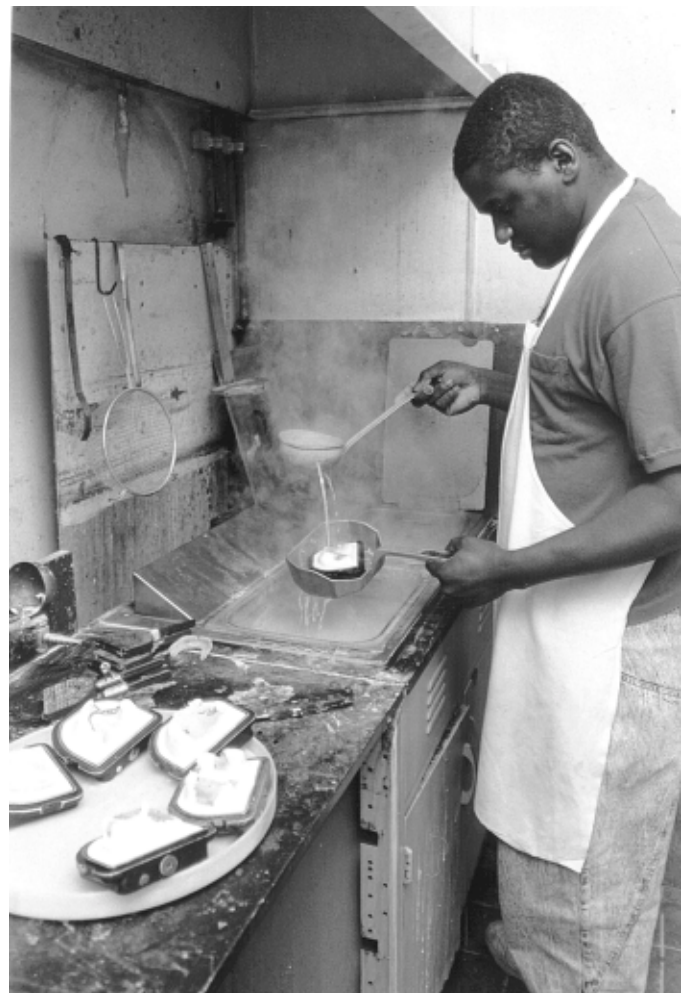
the model, noting the size and shape of the adjacent teeth, as well as gaps within the gumline. Based upon these observations and the dentist's specifications, technicians build and shape a wax tooth or teeth model, using small hand instruments called wax spatulas and wax carvers. They use this wax model to cast the metal framework for the prosthetic device.

After the wax tooth has been formed, dental technicians pour the cast and form the metal and, using small hand-held tools, prepare the surface to allow the metal and porcelain to bond. They then apply porcelain in layers, to arrive at the precise shape and color of a tooth. Technicians place the tooth in a porcelain furnace to bake the porcelain onto the metal framework, and then adjust the shape and color, with subsequent grinding and addition of porcelain to achieve a sealed finish. The final product is a nearly exact replica of the lost tooth or teeth.

In some laboratories, technicians perform all stages of the work, whereas in other labs, each technician does only a few. Dental laboratory technicians can specialize in one of five areas: Orthodontic appliances, crowns and bridges, complete dentures, partial dentures, or ceramics. Job titles can reflect specialization in these areas. For example, technicians who make porcelain and acrylic restorations are called *dental ceramists*.

### Working Conditions

Dental laboratory technicians generally work in clean, well-lighted, and well-ventilated areas. Technicians usually have their own work-



*Dental laboratory technicians use molds of patients' teeth to design crowns, bridges, dentures, and other dental prosthetics.*

benches, which can be equipped with Bunsen burners, grinding and polishing equipment, and hand instruments, such as wax spatulas and wax carvers.

The work is extremely delicate and time consuming. Salaried technicians usually work 40 hours a week, but self-employed technicians frequently work longer hours.

### **Employment**

Dental laboratory technicians held about 43,000 jobs in 2000. Most jobs were in commercial dental laboratories, which usually are small, privately owned businesses with fewer than five employees. However, some laboratories are large; a few employ more than 50 technicians.

Some dental laboratory technicians work in dentists' offices. Others work for hospitals providing dental services, including U.S. Department of Veterans Affairs' hospitals. Some technicians work in dental laboratories in their homes, in addition to their regular job.

### **Training, Other Qualifications, and Advancement**

Most dental laboratory technicians learn their craft on the job. They begin with simple tasks, such as pouring plaster into an impression, and progress to more complex procedures, such as making porcelain crowns and bridges. Becoming a fully trained technician requires an average of 3 to 4 years, depending upon the individual's aptitude and ambition, but it may take a few years more to become an accomplished technician.

Training in dental laboratory technology also is available through community and junior colleges, vocational-technical institutes, and the Armed Forces. Formal training programs vary greatly both in length and in the level of skill they impart.

In 2000, 30 programs in dental laboratory technology were approved (accredited) by the Commission on Dental Accreditation in conjunction with the American Dental Association (ADA). These programs provide classroom instruction in dental materials science, oral anatomy, fabrication procedures, ethics, and related subjects. In addition, each student is given supervised practical experience in a school or an associated dental laboratory. Accredited programs normally take 2 years to complete and lead to an associate degree.

Graduates of 2-year training programs need additional hands-on experience to become fully qualified. Each dental laboratory owner operates in a different way, and classroom instruction does not necessarily expose students to techniques and procedures favored by individual laboratory owners. Students who have taken enough courses to learn the basics of the craft usually are considered good candidates for training, regardless of whether they have completed a formal program. Many employers will train someone without any classroom experience.

The National Board for Certification, an independent board established by the National Association of Dental Laboratories, offers certification in dental laboratory technology. Certification, which is voluntary, can be obtained in five specialty areas: crowns and bridges, ceramics, partial dentures, complete dentures, and orthodontic appliances.

In large dental laboratories, technicians may become supervisors or managers. Experienced technicians may teach or may take jobs with dental suppliers in such areas as product development, marketing, and sales. Still, for most technicians, opening one's own laboratory is the way toward advancement and higher earnings.

A high degree of manual dexterity, good vision, and the ability to recognize very fine color shadings and variations in shape are

necessary. An artistic aptitude for detailed and precise work also is important. High school students interested in becoming dental laboratory technicians should take courses in art, metal and wood shop, drafting, and sciences. Courses in management and business may help those wishing to operate their own laboratories.

### **Job Outlook**

Job opportunities for dental laboratory technicians should be favorable, despite very slow growth in the occupation. Employers have difficulty filling trainee positions, probably because entry-level salaries are relatively low and because the public is not familiar with the occupation.

Although job opportunities are favorable, slower-than-average growth in the employment of dental laboratory technicians is expected through the year 2010, due to changes in dental care. The overall dental health of the population has improved because of fluoridation of drinking water, which has reduced the incidence of dental cavities, and greater emphasis on preventive dental care since the early 1960s. As a result, full dentures will be less common, as most people will need only a bridge or crown. However, during the last few years, demand has arisen from an aging public that is growing increasingly interested in cosmetic prostheses. For example, many dental laboratories are filling orders for composite fillings that are the same shade of white as natural teeth to replace older, less attractive fillings.

### **Earnings**

Median hourly earnings of dental laboratory technicians were \$12.94 in 2000. The middle 50 percent earned between \$9.83 and \$16.82 an hour. The lowest 10 percent earned less than \$7.78, and the highest 10 percent earned more than \$21.47 an hour. Median hourly earnings of dental laboratory technicians in 2000 were \$12.88 in offices and clinics of dentists and \$12.87 in medical and dental laboratories.

Technicians in large laboratories tend to specialize in a few procedures, and, therefore, tend to be paid a lower wage than those employed in small laboratories that perform a variety of tasks.

### **Related Occupations**

Dental laboratory technicians fabricate artificial teeth, crowns and bridges, and orthodontic appliances, following specifications and instructions provided by dentists. Other workers who make and repair medical devices include dispensing opticians, ophthalmic laboratory technicians, orthotists and prosthetists, and precision instrument and equipment repairers.

### **Sources of Additional Information**

For a list of accredited programs in dental laboratory technology, contact:

► Commission on Dental Accreditation, American Dental Association, 211 E. Chicago Ave., Chicago, IL 60611. Internet: <http://www.ada.org>

For information on requirements for certification, contact:

► National Board for Certification in Dental Technology, 1530 Metropolitan Blvd., Tallahassee, FL 32308. Internet:

<http://www.nadl.org/html/certification.html>

For information on career opportunities in commercial laboratories, contact:

► National Association of Dental Laboratories, 1530 Metropolitan Blvd., Tallahassee, FL 32308. Internet: <http://www.nadl.org>

General information on grants and scholarships is available from dental technology schools.

# Diagnostic Medical Sonographers

(O\*NET 29-2032.00)

## Significant Points

- Sonographers should experience favorable job opportunities as ultrasound becomes an increasingly attractive alternative to radiologic procedures.
- More than half of all sonographers are employed by hospitals, and most of the remainder work in physicians' offices and clinics, including diagnostic imaging centers.
- Beginning in 2005, an associate or higher degree from an accredited program will be required for registration.

## Nature of the Work

Diagnostic imaging embraces several procedures that aid in diagnosing ailments, the most familiar being the x ray. Another increasingly common diagnostic imaging method, called magnetic resonance imaging (MRI), uses giant magnets and radio waves rather than radiation to create an image. Not all imaging technologies use ionizing radiation or radio waves, however. Sonography, or ultrasonography, is the use of sound waves to generate an image used for assessment and diagnosis of various medical conditions. Many people associate sonography with obstetrics and the viewing of the fetus in the womb. But this technology has many other applications in the diagnosis and treatment of medical conditions.

Diagnostic medical sonographers, also known as *ultrasonographers*, use special equipment to direct nonionizing, high frequency sound waves into areas of the patient's body. Sonographers operate the equipment, which collects reflected echoes and forms an image that may be videotaped, transmitted, or photographed for interpretation and diagnosis by a physician.

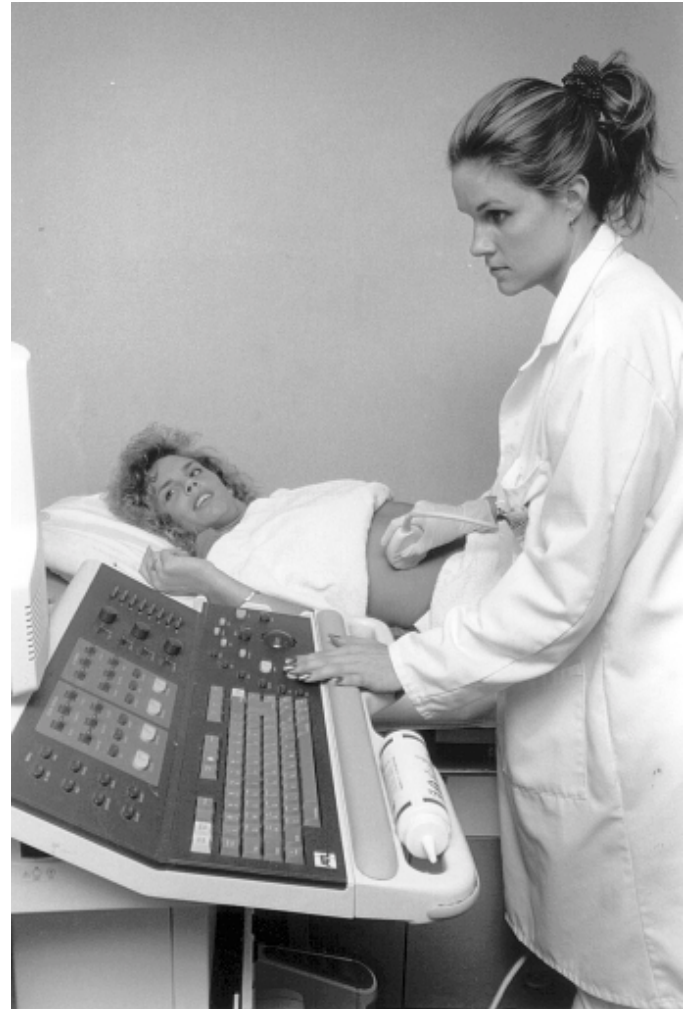
Sonographers begin by explaining the procedure to the patient and recording any additional medical history that may be relevant to the condition being viewed. They then select appropriate equipment settings and direct the patient to move into positions that will provide the best view. To perform the exam, sonographers use a transducer, which transmits sound waves in a cone- or rectangle-shaped beam. Although techniques vary based on the area being examined, sonographers usually spread a special gel on the skin to aid the transmission of sound waves.

Viewing the screen during the scan, sonographers look for subtle visual cues that contrast healthy areas from unhealthy ones. They decide whether the images are satisfactory for diagnostic purposes and select which ones to show to the physician.

Diagnostic medical sonographers may specialize in obstetric and gynecologic sonography (the female reproductive system), abdominal sonography (the liver, kidneys, gallbladder, spleen, and pancreas), neurosonography (the brain), or ophthalmologic sonography (the eyes). In addition, sonographers also may specialize in vascular technology or echocardiography. (Vascular technologists and echocardiographers are covered in the *Handbook* statement on cardiovascular technologists and technicians.)

*Obstetric and gynecologic sonographers* specialize in the study of the female reproductive system. This includes one of the more well known uses of sonography: examining the fetus of a pregnant woman to track its growth and health.

*Abdominal sonographers* inspect a patient's abdominal cavity to help diagnose and treat conditions involving primarily the gallbladder, bile ducts, kidneys, liver, pancreas, and spleen. Abdominal sonographers also are able to scan parts of the heart, although



*A diagnostic medical sonographer examines a patient using a transducer, creating images with sound waves.*

diagnosis of the heart using ultrasound usually is done by echocardiographers.

*Neurosonographers* use ultrasound technology to focus on the nervous system, including the brain. In neonatal care, neurosonographers study and diagnose neurological and nervous system disorders in premature infants. They also may scan blood vessels to check for abnormalities indicating a stroke in infants diagnosed with sickle cell anemia. Like other sonographers, neurosonographers operate transducers to perform the ultrasound, but use different frequencies and beam shapes than obstetric and abdominal sonographers.

*Ophthalmologic sonographers* use ultrasound to study the eyes. Ultrasound aids in the insertion of prosthetic lenses by allowing accurate measurement of the eyes. Ophthalmologic ultrasound also helps diagnose and track tumors, blood supply conditions, separated retinas, and other ailments of the eye and the surrounding tissue. Ophthalmologic sonographers use high frequency transducers made exclusively to study the eyes, which are much smaller than those used in other specialties.

In addition to working directly with patients, diagnostic medical sonographers keep patient records and adjust and maintain equipment. They also may prepare work schedules, evaluate equipment purchases, or manage a sonography or diagnostic imaging department.

## Working Conditions

Most full-time sonographers work about 40 hours a week; they may have evening weekend hours and times when they are on call and must be ready to report to work on short notice.

Sonographers typically work in healthcare facilities that are clean and well lit. Some travel to patients in large vans equipped with sophisticated diagnostic equipment. Sonographers are on their feet for long periods and may have to lift or turn disabled patients. They work at diagnostic imaging machines but may also do some procedures at patients' bedsides.

## Employment

Diagnostic medical sonographers held about 33,000 jobs in 2000. More than half of all sonographer jobs are in hospitals. Most of the rest are in physicians' offices and clinics, primarily in offices specializing in obstetrics and in diagnostic imaging centers. According to the 2000 Sonography Benchmark Survey conducted by the Society of Diagnostic Medical Sonographers (SDMS), about three out of four sonographers worked in urban areas.

## Training, Other Qualifications, and Advancement

There are several avenues for entry into the field of diagnostic medical sonography. Sonographers may train in hospitals, vocational-technical institutions, colleges and universities, and the Armed Forces. Some training programs prefer applicants with a background in science or experience in other health professions, but also will consider high school graduates with courses in math and science, as well as applicants with liberal arts backgrounds.

Colleges and universities offer formal training in both 2- and 4-year programs, culminating in an associate or bachelor's degree. Two-year programs are most prevalent. Course work includes classes in anatomy, physiology, instrumentation, basic physics, patient care, and medical ethics. The Joint Review Committee on Education for Diagnostic Medical Sonography accredits most formal training programs—76 programs in 1999.

Some health workers, such as obstetric nurses and radiologic technologists, seek to increase their marketability by cross-training in fields such as sonography. Many take 1-year programs resulting in a certificate. Additionally, sonographers specializing in one discipline often seek competency in others; for example, obstetric sonographers might seek training in and exposure to abdominal sonography to broaden their opportunities.

While no State requires licensure in diagnostic medical sonography, the American Registry of Diagnostic Medical Sonographers (ARDMS) certifies the competency of sonographers through registration. Because registration provides an independent, objective measure of an individual's professional standing, many employers prefer to hire registered sonographers. Registration with ARDMS requires passing a general physics and instrumentation examination, in addition to passing an exam in a specialty such as obstetrics/gynecology, abdominal, or neurosonography.

While formal education is not necessary to take the exams, an associate or bachelor's degree from an accredited program is preferred. Beginning in 2005, ARDMS will consider for registration only those holding an associate or higher degree. To keep their registration current, sonographers must complete 30 hours of continuing education every 3 years to stay abreast of advances in the occupation and in technology.

Sonographers need good communication and interpersonal skills because they must be able to explain technical procedures and results to their patients, some of whom may be nervous about the exam or the problems it may reveal. They also should have

some background in math and science, especially when they must perform mathematical and scientific calculations in analyses for diagnosis.

## Job Outlook

Employment of diagnostic medical sonographers is expected to grow faster than the average for all occupations through 2010 as the population grows and ages, increasing the demand for diagnostic imaging and therapeutic technology. Some job openings also will arise from the need to replace sonographers who leave the occupation.

Ultrasound is becoming an increasingly attractive alternative to radiologic procedures as patients seek safer treatment methods. Because ultrasound—unlike most diagnostic imaging methods—does not involve radiation, harmful side effects and complications from repeated use are rarer for both the patient and the sonographer. Sonographic technology is expected to evolve rapidly and to spawn many new ultrasound procedures, such as 3D-ultrasonography for use in obstetric and ophthalmologic diagnosis. However, high costs may limit the rate at which some promising new technologies are adopted.

Hospitals will remain the principal employer of diagnostic medical sonographers. However, employment is expected to grow more rapidly in offices and clinics of physicians, including diagnostic imaging centers. Health facilities such as these are expected to grow very rapidly through 2010 due to the strong shift toward outpatient care, encouraged by third-party payers and made possible by technological advances that permit more procedures to be performed outside the hospital.

## Earnings

Median annual earnings of diagnostic medical sonographers were \$44,820 in 2000. The middle 50 percent earned between \$38,390 and \$52,750 a year. The lowest 10 percent earned less than \$32,470, and the highest 10 percent earned more than \$59,310. Median annual earnings of diagnostic medical sonographers in 2000 were \$43,950 in hospitals and \$46,190 in offices and clinics of medical doctors.

## Related Occupations

Diagnostic medical sonographers operate sophisticated equipment to help physicians and other health practitioners diagnose and treat patients. Workers in related occupations include cardiovascular technologists and technicians, clinical laboratory technologists and technicians, nuclear medicine technologists, radiologic technologists and technicians, and respiratory therapists.

## Sources of Additional Information

For more information on a career as a diagnostic medical sonographer, contact:

► Society of Diagnostic Medical Sonographers, 2745 N. Dallas Parkway, Suite 350, Plano, TX 75093-8729. Internet: <http://www.sdms.org>

► The American Registry of Diagnostic Medical Sonographers, 600 Jefferson Plaza, Suite 360, Rockville, MD 20852-1150. Internet: <http://www.ardms.org>

For a current list of accredited education programs in diagnostic medical sonography, write to:

► The Joint Review Committee on Education in Diagnostic Medical Sonography, 1248 Harwood Rd., Bedford, TX 76021-4244. Internet: <http://www.caahep.org>



# Emergency Medical Technicians and Paramedics

(O\*NET 29-2041.00)

## Significant Points

- Job stress is common due to irregular hours and treating patients in life-or-death situations.
- Formal training and certification are required but State requirements vary.
- Employment is projected to grow faster than average as paid emergency medical technician positions replace unpaid volunteers.

## Nature of the Work

People's lives often depend on the quick reaction and competent care of emergency medical technicians (EMTs) and paramedics, EMTs with additional advanced training to perform more difficult pre-hospital medical procedures. Incidents as varied as automobile accidents, heart attacks, drownings, childbirth, and gunshot wounds all require immediate medical attention. EMTs and paramedics provide this vital attention as they care for and transport the sick or injured to a medical facility.

Depending on the nature of the emergency, EMTs and paramedics typically are dispatched to the scene by a 911 operator and often work with police and fire department personnel. (Police and detectives and firefighting occupations appear elsewhere in the *Handbook*.) Once they arrive, they determine the nature and extent of the patient's condition while trying to ascertain whether the patient has preexisting medical problems. Following strict rules and guidelines, they give appropriate emergency care and, when necessary, transport the patient. Some paramedics are trained to treat patients with minor injuries on the scene of an accident or at their home without transporting them to a medical facility. Emergency treatments for more complicated problems are carried out under the direction of medical doctors by radio preceding or during transport.

EMTs and paramedics may use special equipment such as backboards to immobilize patients before placing them on stretchers and securing them in the ambulance for transport to a medical facility. Usually, one EMT or paramedic drives while the other monitors the patient's vital signs and gives additional care as needed. Some EMTs work as part of the flight crew of helicopters that transport critically ill or injured patients to hospital trauma centers.

At the medical facility, EMTs and paramedics help transfer patients to the emergency department, report their observations and actions to staff, and may provide additional emergency treatment. After each run, EMTs and paramedics replace used supplies and check equipment. If a transported patient had a contagious disease, EMTs and paramedics decontaminate the interior of the ambulance and report cases to the proper authorities.

Beyond these general duties, the specific responsibilities of EMTs and paramedics depend on their level of qualification and training. To determine this, the National Registry of Emergency Medical Technicians (NREMT) registers emergency medical service (EMS) providers at four levels: First Responder, EMT-Basic, EMT-Intermediate, and EMT-Paramedic. Some States, however, do their own certification and use numeric ratings from 1 to 4 to distinguish levels of proficiency.

The lowest level—First Responders—are trained to provide basic emergency medical care because they tend to be the first persons to arrive at the scene of an incident. Many firefighters, police



*Emergency medical technicians and paramedics often are the first to examine a patient during an emergency.*

officers, and other emergency workers have this level of training. The EMT-Basic, also known as EMT-1, represents the first component of the emergency medical technician system. An EMT-1 is trained to care for patients on accident scenes and on transport by ambulance to the hospital under medical direction. The EMT-1 has the emergency skills to assess a patient's condition and manage respiratory, cardiac, and trauma emergencies.

The EMT-Intermediate (EMT-2 and EMT-3) has more advanced training that allows administration of intravenous fluids, use of manual defibrillators to give lifesaving shocks to a stopped heart, and use of advanced airway techniques and equipment to assist patients experiencing respiratory emergencies. EMT-Paramedics (EMT-4) provide the most extensive pre-hospital care. In addition to the procedures already described, paramedics may administer drugs orally and intravenously, interpret electrocardiograms (EKGs), perform endotracheal intubations, and use monitors and other complex equipment.

## Working Conditions

EMTs and paramedics work both indoors and outdoors, in all types of weather. They are required to do considerable kneeling, bending, and heavy lifting. These workers risk noise-induced hearing loss from sirens and back injuries from lifting patients. In addition, EMTs and paramedics may be exposed to diseases such as Hepatitis-B and AIDS, as well as violence from drug overdose victims or

mentally unstable patients. The work is not only physically strenuous, but also stressful, involving life-or-death situations and suffering patients. Nonetheless, many people find the work exciting and challenging and enjoy the opportunity to help others.

EMTs and paramedics employed by fire departments work about 50 hours a week. Those employed by hospitals frequently work between 45 and 60 hours a week, and those in private ambulance services, between 45 and 50 hours. Some of these workers, especially those in police and fire departments, are on call for extended periods. Because emergency services function 24 hours a day, EMTs and paramedics have irregular working hours that add to job stress.

### **Employment**

EMTs and paramedics held about 172,000 jobs in 2000. Most career EMTs and paramedics work in metropolitan areas. There are many more volunteer EMTs and paramedics, especially in smaller cities, towns, and rural areas. They volunteer for fire departments, emergency medical services (EMS), or hospitals and may respond to only a few calls for service per month, or may answer the majority of calls, especially in smaller communities. EMTs and paramedics work closely with firefighters, who often are certified as EMTs as well and act as first responders.

Full- and part-time paid EMTs and paramedics were employed in a number of industries. About 4 out of 10 worked in local and suburban transportation, as employees of private ambulance services. About 3 out of 10 worked in local government for fire departments, public ambulance services and EMS. Another 2 out of 10 were found in hospitals, where they worked full time within the medical facility or responded to calls in ambulances or helicopters to transport critically ill or injured patients. The remainder worked in various industries providing emergency services.

### **Training, Other Qualifications, and Advancement**

Formal training and certification is needed to become an EMT or paramedic. All 50 States possess a certification procedure. In 38 States and the District of Columbia, registration with the National Registry of Emergency Medical Technicians (NREMT) is required at some or all levels of certification. Other States administer their own certification examination or provide the option of taking the NREMT examination. To maintain certification, EMTs and paramedics must reregister, usually every 2 years. In order to reregister, an individual must be working as an EMT or paramedic and meet a continuing education requirement.

Training is offered at progressive levels: EMT-Basic, also known as EMT-1; EMT-Intermediate, or EMT-2 and EMT-3; and EMT-paramedic, or EMT-4. The EMT-Basic represents the first level of skills required to work in the emergency medical system. Coursework typically emphasizes emergency skills such as managing respiratory, trauma, and cardiac emergencies and patient assessment. Formal courses are often combined with time in an emergency room or ambulance. The program also provides instruction and practice in dealing with bleeding, fractures, airway obstruction, cardiac arrest, and emergency childbirth. Students learn to use and maintain common emergency equipment, such as backboards, suction devices, splints, oxygen delivery systems, and stretchers. Graduates of approved EMT basic training programs who pass a written and practical examination administered by the State certifying agency or the NREMT earn the title of Registered EMT-Basic. The course also is a prerequisite for EMT-Intermediate and EMT-Paramedic training.

EMT-Intermediate training requirements vary from State to State. Applicants can opt to receive training in EMT-Shock Trauma, where the caregiver learns to start intravenous fluids and give certain medications, or in EMT-Cardiac, which includes learning heart rhythms

and administering advanced medications. Training commonly includes 35 to 55 hours of additional instruction beyond EMT-Basic coursework and covers patient assessment, as well as the use of advanced airway devices and intravenous fluids. Prerequisites for taking the EMT-Intermediate examination include registration as an EMT-Basic, required classroom work, and a specified amount of clinical experience.

The most advanced level of training for this occupation is EMT-Paramedic. At this level, the caregiver receives additional training in body function and more advanced skills. The Paramedic Technology program usually lasts up to 2 years and results in an associate degree in applied science. Such education prepares the graduate to take the NREMT examination and become certified as an EMT-Paramedic. Extensive related coursework and clinical and field experience is required. Due to the longer training requirement, almost all EMT-Paramedics are in paid positions. Refresher courses and continuing education are available for EMTs and paramedics at all levels.

EMTs and paramedics should be emotionally stable, have good dexterity, agility, and physical coordination, and be able to lift and carry heavy loads. They also need good eyesight (corrective lenses may be used) with accurate color vision.

Advancement beyond the EMT-Paramedic level usually means leaving fieldwork. An EMT-Paramedic can become a supervisor, operations manager, administrative director, or executive director of emergency services. Some EMTs and paramedics become instructors, dispatchers, or physician assistants, while others move into sales or marketing of emergency medical equipment. A number of people become EMTs and paramedics to assess their interest in healthcare and then decide to return to school and become registered nurses, physicians, or other health workers.

### **Job Outlook**

Employment of emergency medical technicians and paramedics is expected to grow faster than the average for all occupations through 2010. Population growth and urbanization will increase the demand for full-time paid EMTs and paramedics rather than for volunteers. In addition, a large segment of the population—the aging baby boomers—will further spur demand for EMT services, as they become more likely to have medical emergencies. There will still be demand for part-time, volunteer EMTs and paramedics in rural areas and smaller metropolitan areas. In addition to job growth, openings will occur because of replacement needs; some workers leave because of stressful working conditions, limited advancement potential, and the modest pay and benefits in the private sector.

Most opportunities for EMTs and paramedics are expected to arise in hospitals and private ambulance services. Competition will be greater for jobs in local government, including fire, police, and independent third service rescue squad departments, where salaries and benefits tend to be slightly better. Opportunities will be best for those who have advanced certifications, such as EMT-Intermediate and EMT-Paramedic, as clients and patients demand higher levels of care before arriving at the hospital.

### **Earnings**

Earnings of EMTs and paramedics depend on the employment setting and geographic location as well as the individual's training and experience. Median annual earnings of EMTs and paramedics were \$22,460 in 2000. The middle 50 percent earned between \$17,930 and \$29,270. The lowest 10 percent earned less than \$14,660, and the highest 10 percent earned more than \$37,760. Median annual earnings in the industries employing the largest numbers of EMTs and paramedics in 2000 were:

Local government .....	\$24,800
Hospitals .....	23,590
Local and suburban transportation .....	20,950

Those in emergency medical services who are part of fire or police departments receive the same benefits as firefighters or police officers. For example, many are covered by pension plans that provide retirement at half pay after 20 or 25 years of service or if disabled in the line of duty.

### Related Occupations

Other workers in occupations that require quick and level-headed reactions to life-or-death situations are air traffic controllers, firefighting occupations, physician assistants, police and detectives, and registered nurses.

### Sources of Additional Information

General information about emergency medical technicians and paramedics is available from:

- National Association of Emergency Medical Technicians, 408 Monroe St., Clinton, MS 39056. Internet: <http://www.naemt.org>
- National Registry of Emergency Medical Technicians, P.O. Box 29233, Columbus, OH 43229. Internet: <http://www.nremt.org>
- National Highway Transportation Safety Administration, EMS Division, 400 7th St. SW., NTS-14, Washington, DC. Internet: <http://www.nhtsa.dot.gov/people/injury/ems>

## Licensed Practical and Licensed Vocational Nurses

(O\*NET 29-2061.00)

### Significant Points

- Training lasting about 1 year is available in about 1,100 State-approved programs, mostly in vocational or technical schools.
- Nursing homes will offer the most new jobs.
- Job seekers in hospitals may face competition as the number of hospital jobs for LPNs declines.

### Nature of the Work

Licensed practical nurses (LPNs), or licensed vocational nurses (LVNs) as they are called in Texas and California, care for the sick, injured, convalescent, and disabled under the direction of physicians and registered nurses. (The work of *physicians and surgeons* and *registered nurses* is described elsewhere in the *Handbook*.)

Most LPNs provide basic bedside care. They take vital signs such as temperature, blood pressure, pulse, and respiration. They also treat bedsores, prepare and give injections and enemas, apply dressings, give alcohol rubs and massages, apply ice packs and hot water bottles, and monitor catheters. LPNs observe patients and report adverse reactions to medications or treatments. They collect samples for testing, perform routine laboratory tests, feed patients, and record food and fluid intake and output. They help patients with bathing, dressing, and personal hygiene, keep them comfortable, and care for their emotional needs. In States where the law allows, they may administer prescribed medicines or start intravenous fluids. Some LPNs help deliver, care for, and feed infants. Experienced LPNs may supervise nursing assistants and aides.

LPNs in nursing homes provide routine bedside care, help evaluate residents' needs, develop care plans, and supervise the care provided by nursing aides. In doctors' offices and clinics, they also



*Licensed practical and licensed vocational nurses take vital signs such as temperature, blood pressure, pulse, and respiration.*

may make appointments, keep records, and perform other clerical duties. LPNs who work in private homes also may prepare meals and teach family members simple nursing tasks.

### Working Conditions

Most licensed practical nurses in hospitals and nursing homes work a 40-hour week, but because patients need around-the-clock care, some work nights, weekends, and holidays. They often stand for long periods and help patients move in bed, stand, or walk.

LPNs may face hazards from caustic chemicals, radiation, and infectious diseases such as hepatitis. They are subject to back injuries when moving patients and shock from electrical equipment. They often must deal with the stress of heavy workloads. In addition, the patients they care for may be confused, irrational, agitated, or uncooperative.

### Employment

Licensed practical nurses held about 700,000 jobs in 2000. Twenty-nine percent of LPNs worked in nursing homes, 28 percent worked in hospitals, and 14 percent in physicians' offices and clinics. Others worked for home healthcare services, residential care facilities, schools, temporary help agencies, or government agencies; about 1 in 5 worked part time.

### Training, Other Qualifications, and Advancement

All States and the District of Columbia require LPNs to pass a licensing examination after completing a State-approved practical nursing program. A high school diploma, or equivalent, usually is required for entry, although some programs accept candidates without a diploma or are designed as part of a high school curriculum.

In 2000, approximately 1,100 State-approved programs provided practical nursing training. Almost 6 out of 10 students were enrolled in technical or vocational schools, while 3 out of 10 were in community and junior colleges. Others were in high schools, hospitals, and colleges and universities.

Most practical nursing programs last about 1 year and include both classroom study and supervised clinical practice (patient care). Classroom study covers basic nursing concepts and patient-care related subjects, including anatomy, physiology, medical-surgical nursing, pediatrics, obstetrics, psychiatric nursing, administration of drugs, nutrition, and first aid. Clinical practice usually is in a hospital, but sometimes includes other settings.



LPNs should have a caring, sympathetic nature. They should be emotionally stable because work with the sick and injured can be stressful. They also should have keen observational, decision making, and communication skills. As part of a healthcare team, they must be able to follow orders and work under close supervision.

### Job Outlook

Employment of LPNs is expected to grow about as fast as the average for all occupations through 2010 in response to the long-term care needs of a rapidly growing elderly population and the general growth of healthcare. Replacement needs will be a major source of job openings, as many workers leave the occupation permanently.

Employment of LPNs in nursing homes is expected to grow faster than the average. Nursing homes will offer the most new jobs for LPNs as the number of aged and disabled persons in need of long-term care rises. In addition to caring for the aged and disabled, nursing homes will be called on to care for the increasing number of patients who have been discharged from the hospital but who have not recovered enough to return home.

LPNs seeking positions in hospitals may face competition, as the number of hospital jobs for LPNs declines. An increasing proportion of sophisticated procedures, which once were performed only in hospitals, are being performed in physicians' offices and clinics, including ambulatory surgicenters and emergency medical centers, due largely to advances in technology. As a result, employment of LPNs is projected to grow much faster than average in these places as healthcare expands outside the traditional hospital setting.

Employment of LPNs is expected to grow much faster than average in home healthcare services. This is in response to a growing number of older persons with functional disabilities, consumer preference for care in the home, and technological advances, which make it possible to bring increasingly complex treatments into the home.

### Earnings

Median annual earnings of licensed practical nurses were \$29,440 in 2000. The middle 50 percent earned between \$24,920 and \$34,800. The lowest 10 percent earned less than \$21,520, and the highest 10 percent earned more than \$41,800. Median annual earnings in the industries employing the largest numbers of licensed practical nurses in 2000 were as follows:

Personnel supply services .....	\$35,750
Home health care services .....	31,220
Nursing and personal care facilities .....	29,980
Hospitals .....	28,450
Offices and clinics of medical doctors .....	27,520

### Related Occupations

LPNs work closely with people while helping them. So do emergency medical technicians and paramedics, social and human service assistants, surgical technologists, and teacher assistants.

### Sources of Additional Information

For information about practical nursing, contact:

- National League for Nursing, 61 Broadway, New York, NY 10006. Internet: <http://www.nln.org>
- National Association for Practical Nurse Education and Service, Inc., 8607 Second Avenue, Suite 404-A, Silver Spring, MD 20910.
- National Federation of Licensed Practical Nurses, Inc., 893 US Highway 70 West, Suite 202, Garner, NC 27529-2597.

## Medical Assistants

(O\*NET 31-9092.00)

### Significant Points

- Medical assistants is expected to be one of the fastest growing occupations through the year 2010.
- Job prospects should be best for medical assistants with formal training or experience.

### Nature of the Work

Medical assistants perform routine administrative and clinical tasks to keep the offices and clinics of physicians, podiatrists, chiropractors, and optometrists running smoothly. They should not be confused with physician assistants who examine, diagnose, and treat patients under the direct supervision of a physician. (Physician assistants are discussed elsewhere in the *Handbook*.)

The duties of medical assistants vary from office to office, depending on office location, size, and specialty. In small practices, medical assistants usually are "generalists," handling both administrative and clinical duties and reporting directly to an office manager, physician, or other health practitioner. Those in large practices tend to specialize in a particular area under the supervision of department administrators.

Medical assistants perform many administrative duties. They answer telephones, greet patients, update and file patient medical records, fill out insurance forms, handle correspondence, schedule appointments, arrange for hospital admission and laboratory services, and handle billing and bookkeeping.

Clinical duties vary according to State law and include taking medical histories and recording vital signs, explaining treatment procedures to patients, preparing patients for examination, and assisting the physician during the examination. Medical assistants collect and prepare laboratory specimens or perform basic laboratory tests on the premises, dispose of contaminated supplies, and sterilize medical instruments. They instruct patients about medication and special diets, prepare and administer medications as directed by a physician, authorize drug refills as directed, telephone prescriptions to a pharmacy, draw blood, prepare patients for x rays, take electrocardiograms, remove sutures, and change dressings.

Medical assistants also may arrange examining room instruments and equipment, purchase and maintain supplies and equipment, and keep waiting and examining rooms neat and clean.



*The duties of medical assistants vary from office to office, depending on office location, size, and specialty.*



Assistants who specialize have additional duties. *Podiatric medical assistants* make castings of feet, expose and develop x rays, and assist podiatrists in surgery. *Ophthalmic medical assistants* help ophthalmologists provide medical eye care. They conduct diagnostic tests, measure and record vision, and test eye muscle function. They also show patients how to insert, remove, and care for contact lenses; and they apply eye dressings. Under the direction of the physician, they may administer eye medications. They also maintain optical and surgical instruments and may assist the ophthalmologist in surgery.

### Working Conditions

Medical assistants work in well-lighted, clean environments. They constantly interact with other people, and may have to handle several responsibilities at once.

Most full-time medical assistants work a regular 40-hour week. Some work part-time, evenings, or weekends.

### Employment

Medical assistants held about 329,000 jobs in 2000. Sixty percent were in physicians' offices, and about 15 percent were in hospitals, including inpatient and outpatient facilities. The rest were in nursing homes, offices of other health practitioners, and other health care facilities.

### Training, Other Qualifications, and Advancement

Most employers prefer graduates of formal programs in medical assisting. Such programs are offered in vocational-technical high schools, postsecondary vocational schools, community and junior colleges, and in colleges and universities. Postsecondary programs usually last either 1 year, resulting in a certificate or diploma, or 2 years, resulting in an associate degree. Courses cover anatomy, physiology, and medical terminology as well as typing, transcription, recordkeeping, accounting, and insurance processing. Students learn laboratory techniques, clinical and diagnostic procedures, pharmaceutical principles, medication administration, and first aid. They study office practices, patient relations, medical law, and ethics. Accredited programs include an internship that provides practical experience in physicians' offices, hospitals, or other healthcare facilities.

Two agencies recognized by the U.S. Department of Education accredit programs in medical assisting: the Commission on Accreditation of Allied Health Education Programs (CAAHEP) and the Accrediting Bureau of Health Education Schools (ABHES). In 2001, there were about 500 medical assisting programs accredited by CAAHEP and about 170 accredited by ABHES. The Committee on Accreditation for Ophthalmic Medical Personnel approved 14 programs in ophthalmic medical assisting.

Formal training in medical assisting, while generally preferred, is not always required. Some medical assistants are trained on the job, although this is less common than in the past. Applicants usually need a high school diploma or the equivalent. Recommended high school courses include mathematics, health, biology, typing, bookkeeping, computers, and office skills. Volunteer experience in the healthcare field also is helpful.

Although there is no licensing for medical assistants, some States require them to take a test or a course before they can perform certain tasks, such as taking x rays. Employers prefer to hire experienced workers or certified applicants who have passed a national examination, indicating that the medical assistant meets certain standards of competence. The American Association of Medical Assistants awards the Certified Medical Assistant credential; the American Medical Technologists awards the Registered Medical Assistant credential; the American Society of Podiatric Medical

Assistants awards the Podiatric Medical Assistant Certified credential; and the Joint Commission on Allied Health Personnel in Ophthalmology awards credentials at three levels—Certified Ophthalmic Assistant, Certified Ophthalmic Technician, and Certified Ophthalmic Medical Technologist.

Medical assistants may be able to advance to office manager. They may qualify for a variety of administrative support occupations, or may teach medical assisting. Some, with additional education, enter other health occupations such as nursing and medical technology.

Medical assistants deal with the public; therefore, they must be neat and well-groomed and have a courteous, pleasant manner. Medical assistants must be able to put patients at ease and explain physicians' instructions. They must respect the confidential nature of medical information. Clinical duties require a reasonable level of manual dexterity and visual acuity.

### Job Outlook

Employment of medical assistants is expected to grow much faster than the average for all occupations through the year 2010 as the health services industry expands because of technological advances in medicine, and a growing and aging population. It is one of the fastest growing occupations.

Employment growth will be driven by the increase in the number of group practices, clinics, and other healthcare facilities that need a high proportion of support personnel, particularly the flexible medical assistant who can handle both administrative and clinical duties. Medical assistants primarily work in outpatient settings, where much faster than average growth is expected.

In view of the preference of many health care employers for trained personnel, job prospects should be best for medical assistants with formal training or experience, particularly those with certification.

### Earnings

The earnings of medical assistants vary, depending on experience, skill level, and location. Median annual earnings of medical assistants were \$23,000 in 2000. The middle 50 percent earned between \$19,460 and \$27,460 a year. The lowest 10 percent earned less than \$16,700, and the highest 10 percent earned more than \$32,850 a year. Median annual earnings in the industries employing the largest number of medical assistants in 2000 were as follows:

Offices and clinics of medical doctors .....	\$23,610
Hospitals .....	22,950
Health and allied services, not elsewhere classified .....	22,860
Offices of osteopathic physicians .....	21,420
Offices of other health practitioners .....	20,860

### Related Occupations

Workers in other medical support occupations include dental assistants, medical records and health information technicians, medical secretaries, occupational therapist assistants and aides, pharmacy aides, and physical therapist assistants and aides.

### Sources of Additional Information

Information about career opportunities, CAAHEP-accredited educational programs in medical assisting, and the Certified Medical Assistant exam is available from:

► The American Association of Medical Assistants, 20 North Wacker Dr., Suite 1575, Chicago, IL 60606. Internet: <http://www.aama-ntl.org>

Information about career opportunities and the Registered Medical Assistant certification exam is available from:

► Registered Medical Assistants of American Medical Technologists, 710 Higgins Rd., Park Ridge, IL 60068-5765. Internet: <http://www.amt1.com>

For a list of ABHES-accredited educational programs in medical assisting, contact:

► Accrediting Bureau of Health Education Schools, 803 West Broad St., Suite 730, Falls Church, VA 22046. Internet: <http://www.abhes.org>

Information about career opportunities, training programs, and the Certified Ophthalmic Assistant exam is available from:

► Joint Commission on Allied Health Personnel in Ophthalmology, 2025 Woodlane Dr., St. Paul, MN 55125-2995. Internet: <http://www.jcahpo.org>

Information about careers for podiatric assistants is available from:

► American Society of Podiatric Medical Assistants, 2124 S. Austin Blvd., Cicero, IL 60650.

## Medical Records and Health Information Technicians

(O\*NET 29-2071.00)

### Significant Points

- Medical records and health information technicians are projected to be one of the fastest growing occupations.
- High school students can improve chances of acceptance into a medical record and health information education program by taking anatomy, physiology, medical terminology, and computer courses.
- Most technicians will be employed by hospitals, but job growth will be faster in offices and clinics of physicians, nursing homes, and home health agencies.

### Nature of the Work

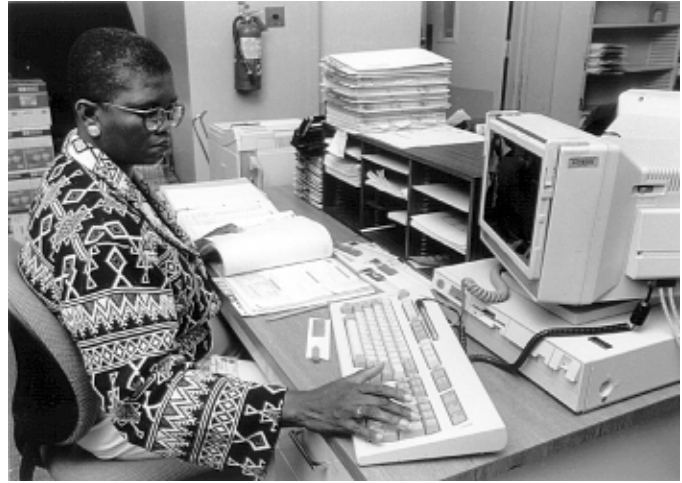
Every time health care personnel treat a patient, they record what they observed, and how the patient was treated medically. This record includes information the patient provides concerning their symptoms and medical history, the results of examinations, reports of x rays and laboratory tests, diagnoses, and treatment plans. Medical records and health information technicians organize and evaluate these records for completeness and accuracy.

Medical records and health information technicians begin to assemble patients' health information by first making sure their initial medical charts are complete. They ensure all forms are completed and properly identified and signed, and all necessary information is in the computer. Sometimes, they communicate with physicians or others to clarify diagnoses or get additional information.

Technicians assign a code to each diagnosis and procedure. They consult classification manuals and rely, also, on their knowledge of disease processes. Technicians then use a software program to assign the patient to one of several hundred "diagnosis-related groups," or DRG's. The DRG determines the amount the hospital will be reimbursed if the patient is covered by Medicare or other insurance programs using the DRG system. Technicians who specialize in coding are called health information coders, medical record coders, coder/abstractors, or coding specialists. In addition to the DRG system, coders use other coding systems, such as those geared towards ambulatory settings.

Technicians also use computer programs to tabulate and analyze data to help improve patient care, control costs, for use in legal actions, in response to surveys, or for use in research studies. *Tumor registrars* compile and maintain records of patients who have cancer to provide information to physicians and for research studies.

Medical records and health information technicians' duties vary with the size of the facility. In large to medium facilities, technicians may specialize in one aspect of health information, or supervise health information clerks and transcriptionists while a *medical records and health information administrator* manages the department. (See the



*The duties of medical records and health information technicians vary with the size of the facility.*

statement on medical and health services managers elsewhere in the *Handbook*.) In small facilities, a credentialed medical records and health information technician sometimes manages the department.

### Working Conditions

Medical records and health information technicians usually work a 40-hour week. Some overtime may be required. In hospitals—where health information departments often are open 24 hours a day, 7 days a week—technicians may work day, evening, and night shifts.

Medical records and health information technicians work in pleasant and comfortable offices. This is one of the few health occupations in which there is little or no physical contact with patients. Because accuracy is essential, technicians must pay close attention to detail. Technicians who work at computer monitors for prolonged periods must guard against eyestrain and muscle pain.

### Employment

Medical records and health information technicians held about 136,000 jobs in 2000. About 4 out of 10 jobs were in hospitals. The rest were mostly in nursing homes, medical group practices, clinics, and home health agencies. Insurance firms that deal in health matters employ a small number of health information technicians to tabulate and analyze health information. Public health departments also hire technicians to supervise data collection from health care institutions and to assist in research.

### Training, Other Qualifications, and Advancement

Medical records and health information technicians entering the field usually have an associate degree from a community or junior college. In addition to general education, coursework includes medical terminology, anatomy and physiology, legal aspects of health information, coding and abstraction of data, statistics, database management, quality improvement methods, and computer training. Applicants can improve their chances of admission into a program by taking biology, chemistry, health, and computer courses in high school.

Hospitals sometimes advance promising health information clerks to jobs as medical records and health information technicians, although this practice may be less common in the future. Advancement usually requires 2 to 4 years of job experience and completion of a hospital's in-house training program.

Most employers prefer to hire Registered Health Information Technicians (RHIT), who must pass a written examination offered

by AHIMA. To take the examination, a person must graduate from a 2-year associate degree program accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP) of the American Medical Association. Technicians trained in non-CAAHEP accredited programs, or on the job, are not eligible to take the examination. In 2001, CAAHEP accredited 177 programs for health information technicians. Technicians who specialize in coding may also obtain voluntary certification.

Experienced medical records and health information technicians usually advance in one of two ways—by specializing or managing. Many senior technicians specialize in coding, particularly Medicare coding, or in tumor registry.

In large medical records and health information departments, experienced technicians may advance to section supervisor, overseeing the work of the coding, correspondence, or discharge sections, for example. Senior technicians with RHIT credentials may become director or assistant director of a medical records and health information department in a small facility. However, in larger institutions, the director is usually an administrator, with a bachelor's degree in medical records and health information administration. (See the statement on health services managers elsewhere in the *Handbook*.)

### Job Outlook

Job prospects for formally trained technicians should be very good. Employment of medical records and health information technicians is expected to grow much faster than the average for all occupations through 2010, due to rapid growth in the number of medical tests, treatments, and procedures which will be increasingly scrutinized by third-party payers, regulators, courts, and consumers.

Hospitals will continue to employ a large percentage of health information technicians, but growth will not be as fast as in other areas. Increasing demand for detailed records in offices and clinics of physicians should result in fast employment growth, especially in large group practices. Rapid growth is also expected in nursing homes and home health agencies.

### Earnings

Median annual earnings of medical records and health information technicians were \$22,750 in 2000. The middle 50 percent earned between \$18,700 and \$28,590. The lowest 10 percent earned less than \$15,710, and the highest 10 percent earned more than \$35,170. Median annual earnings in the industries employing the largest numbers of medical records and health information technicians in 2000 were as follows:

Nursing and personal care facilities .....	\$23,760
Hospitals .....	23,540
Offices and clinics of medical doctors .....	21,090

### Related Occupations

Medical records and health information technicians need a strong clinical background to analyze the contents of medical records. Workers in other occupations requiring knowledge of medical terminology, anatomy, and physiology without physical contact with the patient are medical secretaries and medical transcriptionists.

### Sources of Additional Information

Information on careers in medical records and health information technology, including a list of CAAHEP-accredited programs is available from:

► American Health Information Management Association,  
233 N. Michigan Ave., Suite 2150, Chicago, IL 60601-5800. Internet:  
<http://www.ahima.org>

## Medical Transcriptionists

(O\*NET 31-9094.00)

### Significant Points

- Employers prefer medical transcriptionists who have completed a vocational school or community college program.
- Employment is projected to grow faster than average due to increasing demand for medical transcription services.
- Some medical transcriptionists enjoy the flexibility of working at home, especially those with previous experience in a hospital or clinic setting.

### Nature of the Work

Medical transcriptionists, also called *medical transcribers* and *medical stenographers*, listen to dictated recordings made by physicians and other healthcare professionals and transcribe them into medical reports, correspondence, and other administrative material. They generally listen to recordings on a special headset, using a foot pedal to pause the recording when necessary, and key the text into a personal computer or word processor, editing as necessary for grammar and clarity. The documents they produce include discharge summaries, history and physical examination reports, operating room reports, consultation reports, autopsy reports, diagnostic imaging studies, and referral letters. Medical transcriptionists return transcribed documents to the dictator for review and signature, or correction. These documents eventually become part of patients' permanent files.

To understand and accurately transcribe dictated reports into a format that is clear and comprehensible for the reader, medical transcriptionists must understand medical terminology, anatomy and physiology, diagnostic procedures, and treatment. They also must be able to translate medical jargon and abbreviations into their expanded forms. To help identify terms appropriately, transcriptionists refer to standard medical reference materials—both printed and electronic; some of these are available over the Internet. Medical transcriptionists must comply with specific standards that apply to the style of medical records, in addition to the legal and ethical requirements involved with keeping patient records confidential.

Experienced transcriptionists spot mistakes or inconsistencies in a medical report and check back with the dictator to correct the information. Their ability to understand and correctly transcribe patient assessments and treatments reduces the chance of patients receiving ineffective or even harmful treatments and ensures high quality patient care.

Currently, most healthcare providers transmit dictation to medical transcriptionists using either digital or analog dictating equipment. With the emergence of the Internet, some transcriptionists receive dictation over the Internet and are able to quickly return transcribed documents to clients for approval. As confidentiality concerns are resolved, this practice will become more prevalent. Another emerging trend is the implementation of speech recognition technology, which electronically translates sound into text and creates drafts of reports. Reports are then formatted; edited for mistakes in translation, punctuation, or grammar; and checked for consistency and possible medical errors. Transcriptionists working in specialized areas with more standard terminology, such as radiology or pathology, are more likely to encounter speech recognition technology. However, use of speech recognition technology will become more widespread as the technology becomes more sophisticated.



*Transcriptionists use medical reference materials to ensure that medical terms are correctly identified.*

Medical transcriptionists who work in physicians' offices and clinics may have other office duties, such as receiving patients, scheduling appointments, answering the telephone, and handling incoming and outgoing mail. Medical secretaries, discussed elsewhere in the *Handbook*, may also transcribe as part of their jobs. Court reporters, also discussed elsewhere in the *Handbook*, have similar duties, but with a different focus. They take verbatim reports of speeches, conversations, legal proceedings, meetings, and other events when written accounts of spoken words are necessary for correspondence, records, or legal proof.

### **Working Conditions**

The majority of these workers are employed in comfortable settings, such as hospitals, physicians' offices, clinics, laboratories, medical libraries, government medical facilities, or at home. An increasing number of medical transcriptionists telecommute from home-based offices as employees or subcontractors for hospitals and transcription services or as self-employed independent contractors.

Work in this occupation presents few hazards, although sitting in the same position for long periods can be tiring, and workers can suffer wrist, back, neck, or eye problems due to strain and risk repetitive motion injuries such as carpal tunnel syndrome. The pressure to be accurate and fast also can be stressful.

Many medical transcriptionists work a standard 40-hour week. Self-employed medical transcriptionists are more likely to work irregular hours—including part time, evenings, weekends, or on an on-call basis.

### **Employment**

Medical transcriptionists held about 102,000 jobs in 2000. About 2 out of 5 worked in hospitals and about another 2 out of 5 in physicians' offices and clinics. Others worked for laboratories, colleges and universities, transcription services, and temporary help agencies.

### **Training, Other Qualifications, and Advancement**

Employers prefer to hire transcriptionists who have completed postsecondary training in medical transcription, offered by many vocational schools, community colleges, and distance-learning programs. Completion of a 2-year associate degree or 1-year certificate program—including coursework in anatomy, medical terminology, medicolegal issues, and English grammar and punctuation—is highly recommended, but not always required. Many of these programs include supervised on-the-job experience. Some transcriptionists, especially those already familiar with medical terminology due to previous experience as a nurse or medical secretary, become proficient through on-the-job training.

The American Association for Medical Transcription (AAMT) awards the voluntary designation, Certified Medical Transcriptionist (CMT), to those who earn passing scores on written and practical examinations. As in many other fields, certification is recognized as a sign of competence. Because medical terminology is constantly evolving, medical transcriptionists are encouraged to regularly update their skills. Every 3 years, CMTs must earn continuing education credits to be recertified.

In addition to understanding medical terminology, transcriptionists must have good English grammar and punctuation skills, as well as familiarity with personal computers and word processing software. Normal hearing acuity and good listening skills also are necessary. Employers often require applicants to take pre-employment tests.

With experience, medical transcriptionists can advance to supervisory positions, home-based work, consulting, or teaching. With additional education or training, some become medical records and health information technicians, medical coders, or medical records and health information administrators.

### **Job Outlook**

Employment of medical transcriptionists is projected to grow faster than the average for all occupations through 2010. Demand for medical transcription services will be spurred by a growing and aging population. Older age groups receive proportionately greater numbers of medical tests, treatments, and procedures that require documentation. A high level of demand for transcription services also will be sustained by the continued need for electronic documentation that can be easily shared among providers, third-party payers, regulators, and consumers. Growing numbers of medical transcriptionists will be needed to amend patients' records, edit for grammar, and discover discrepancies in medical records.

Advancements in speech recognition technology are not projected to significantly reduce the need for medical transcriptionists because these workers will continue to be needed to review and edit drafts for accuracy. In spite of the advances in this technology, it has been difficult for the software to grasp and analyze the human voice and the English language with all its diversity. There will continue to be a need for skilled medical transcriptionists to identify and appropriately edit the inevitable errors created by speech recognition systems, and create a final document.

Hospitals will continue to employ a large percentage of medical transcriptionists, but job growth will not be as fast as in other areas. Increasing demand for standardized records in offices and clinics of physicians should result in rapid employment growth, especially in large group practices. Job opportunities should be the best for



those who earn an associate degree or certification from the American Association for Medical Transcription.

### Earnings

Medical transcriptionists had median hourly earnings of \$12.15 in 2000. The middle 50 percent earned between \$10.07 and \$14.41. The lowest 10 percent earned less than \$8.66, and the highest 10 percent earned more than \$16.70. Median hourly earnings in the industries employing the largest numbers of medical transcriptionists in 2000 were as follows:

Offices and clinics of medical doctors .....	\$12.25
Hospitals .....	12.14
Mailing, reproduction, and stenographic services .....	11.47

Compensation methods for medical transcriptionists vary. Some are paid based on the number of hours they work or on the number of lines they transcribe. Others receive a base pay per hour with incentives for extra production. Large hospitals and healthcare organizations usually prefer to pay for the time an employee works. Independent contractors and employees of transcription services almost always receive production-based pay.

According to a 1999 study conducted by Hay Management Consultants for the American Association for Medical Transcription, entry-level medical transcriptionists had median hourly earnings of \$10.32 and the most experienced transcriptionists had median hourly earnings of \$13.00. Earnings were highest in organizations employing 1,000 or more workers. Transcriptionists receiving production-based pay earned about 7 to 8.5 cents per Standardized Line (based on a 65-character line, counting all keystrokes). However, independent contractors—who have higher expenses than their corporate counterparts, receive no benefits, and face higher risk of termination than employed transcriptionists—typically charge about 12 to 13 cents per Standardized Line.

### Related Occupations

A number of other workers type, record information, and process paperwork. Among these are court reporters, secretaries and administrative assistants, receptionists and information clerks, and human resources assistants, except payroll and timekeeping. Other workers who provide medical support include medical assistants and medical records and health information technicians.

### Sources of Additional Information

For information on a career as a medical transcriptionist, send a self-addressed, stamped envelope to:

► American Association for Medical Transcription, 3460 Oakdale Rd., Suite M, Modesto, CA 95355-9690. Internet: <http://www.aamt.org>

State employment service offices can provide information about job openings for medical transcriptionists.

---

## Nuclear Medicine Technologists

---

(O\*NET 29-2033.00)

---

### Significant Points

- Faster-than-average growth will arise from an increase in the number of middle-aged and elderly persons, who are the primary users of diagnostic procedures.
- Technologists with cross training in radiologic technology or other modalities will have the best prospects.

### Nature of the Work

In nuclear medicine, radionuclides—unstable atoms that emit radiation spontaneously—are used to diagnose and treat disease. Radionuclides are purified and compounded like other drugs to form radiopharmaceuticals. Nuclear medicine technologists administer these radiopharmaceuticals to patients, then monitor the characteristics and functions of tissues or organs in which they localize. Abnormal areas show higher or lower concentrations of radioactivity than normal.

Nuclear medicine technologists operate cameras that detect and map the radioactive drug in the patient's body to create an image on photographic film or a computer monitor. Radiologic technologists and technicians also operate diagnostic imaging equipment, but their equipment creates an image by projecting an x ray through the patient. (See the statement on radiologic technologists and technicians elsewhere in the *Handbook*.)

Nuclear medicine technologists explain test procedures to patients. They prepare a dosage of the radiopharmaceutical and administer it by mouth, injection, or other means. When preparing radiopharmaceuticals, technologists adhere to safety standards that keep the radiation dose to workers and patients as low as possible.

Technologists position patients and start a gamma scintillation camera, or "scanner," which creates images of the distribution of a radiopharmaceutical as it localizes in and emits signals from the patient's body. Technologists produce the images on a computer screen or on film for a physician to interpret. Some nuclear medicine studies, such as cardiac function studies, are processed with the aid of a computer.

Nuclear medicine technologists also perform radioimmunoassay studies that assess the behavior of a radioactive substance inside the body. For example, technologists may add radioactive substances to blood or serum to determine levels of hormones or therapeutic drug content.

Technologists keep patient records and record the amount and type of radionuclides received, used, and disposed of.



*A nuclear medical technologist can view images of tissues or organs on a computer monitor.*

## Working Conditions

Nuclear medicine technologists generally work a 40-hour week. This may include evening or weekend hours in departments that operate on an extended schedule. Opportunities for part-time and shift work are also available. In addition, technologists in hospitals may have on-call duty on a rotational basis.

Because technologists are on their feet much of the day, and may lift or turn disabled patients, physical stamina is important.

Although there is potential for radiation exposure in this field, it is kept to a minimum by the use of shielded syringes, gloves, and other protective devices and adherence to strict radiation safety guidelines. Technologists also wear badges that measure radiation levels. Because of safety programs, however, badge measurements rarely exceed established safety levels.

## Employment

Nuclear medicine technologists held about 18,000 jobs in 2000. About two-thirds of all jobs were in hospitals. The rest were in physicians' offices and clinics, including diagnostic imaging centers.

## Training, Other Qualifications, and Advancement

Nuclear medicine technology programs range in length from 1 to 4 years and lead to a certificate, associate's degree, or bachelor's degree. Generally, certificate programs are offered in hospitals, associate programs in community colleges, and bachelor's programs in 4-year colleges and in universities. Courses cover physical sciences, the biological effects of radiation exposure, radiation protection and procedures, the use of radiopharmaceuticals, imaging techniques, and computer applications.

One-year certificate programs are for health professionals, especially radiologic technologists and diagnostic medical sonographers, who wish to specialize in nuclear medicine. They also attract medical technologists, registered nurses, and others who wish to change fields or specialize. Others interested in the nuclear medicine technology field have three options: A 2-year certificate program, a 2-year associate program, or a 4-year bachelor's program.

The Joint Review Committee on Education Programs in Nuclear Medicine Technology accredits most formal training programs in nuclear medicine technology. In 2000, there were 95 accredited programs in the continental United States and Puerto Rico.

All nuclear medicine technologists must meet the minimum Federal standards on the administration of radioactive drugs and the operation of radiation detection equipment. In addition, about half of all States require technologists to be licensed. Technologists also may obtain voluntary professional certification or registration. Registration or certification is available from the American Registry of Radiologic Technologists and from the Nuclear Medicine Technology Certification Board. Most employers prefer to hire certified or registered technologists.

Nuclear medicine technologists should be sensitive to patients' physical and psychological needs. They must pay attention to detail, follow instructions, and work as part of a team. In addition, operating complicated equipment requires mechanical ability and manual dexterity.

Technologists may advance to supervisor, then to chief technologist, and to department administrator or director. Some technologists specialize in a clinical area such as nuclear cardiology or computer analysis or leave patient care to take positions in research laboratories. Some become instructors or directors in nuclear medicine technology programs, a step that usually requires a bachelor's degree or a master's in nuclear medicine technology. Others leave the occupation to work as sales or training

representatives for medical equipment and radiopharmaceutical manufacturing firms, or as radiation safety officers in regulatory agencies or hospitals.

## Job Outlook

Employment of nuclear medicine technologists is expected to grow faster than the average for all occupations through the year 2010. The number of openings each year will be very low because the occupation is small. Growth will arise from an increase in the number of middle-aged and older persons who are the primary users of diagnostic procedures, including nuclear medicine tests.

Technological innovations may increase the diagnostic uses of nuclear medicine. One example is the use of radiopharmaceuticals in combination with monoclonal antibodies to detect cancer at far earlier stages than is customary today, and without resorting to surgery. Another is the use of radionuclides to examine the heart's ability to pump blood. Wider use of nuclear medical imaging to observe metabolic and biochemical changes for neurology, cardiology, and oncology procedures, also will spur some demand for nuclear medicine technologists.

On the other hand, cost considerations will affect the speed with which new applications of nuclear medicine grow. Some promising nuclear medicine procedures, such as positron emission tomography (PET), are extremely costly, and hospitals contemplating them will have to consider equipment costs, reimbursement policies, and the number of potential users.

## Earnings

Median annual earnings of nuclear medicine technologists were \$44,130 in 2000. The middle 50 percent earned between \$38,150 and \$52,190. The lowest 10 percent earned less than \$31,910, and the highest 10 percent earned more than \$58,500. Median annual earnings of nuclear medicine technologists in 2000 were \$44,000 in hospitals.

## Related Occupations

Nuclear medical technologists operate sophisticated equipment to help physicians and other health practitioners diagnose and treat patients. Cardiovascular technologists and technicians, clinical laboratory technologists and technicians, diagnostic medical sonographers, radiation therapists, radiologic technologists and technicians, and respiratory therapists also perform similar functions.

## Sources of Additional Information

Additional information on a career as a nuclear medicine technologist is available from:

► The Society of Nuclear Medicine-Technologist Section, 1850 Samuel Morse Dr., Reston, VA 22090. Internet: <http://www.snm.org>

For career information, send a stamped, self-addressed business size envelope with your request to:

► American Society of Radiologic Technologists, Customer Service Department, 15000 Central Ave. SE., Albuquerque, NM 87123-3917, or call (800) 444-2778. Internet: <http://www.asrt.org/asrt.htm>

For a list of accredited programs in nuclear medicine technology, write to:

► Joint Review Committee on Educational Programs in Nuclear Medicine Technology, PMB 418, 1 2nd Avenue East, Suite C, Polson, MT 59860-2107. Internet: <http://www.jrcnmt.org>

Information on certification is available from:

► American Registry of Radiologic Technologists, 1255 Northland Dr., St. Paul, MN 55120-1155. Internet: <http://www.arrt.org>

► Nuclear Medicine Technology Certification Board, 2970 Clairmont Rd., Suite 610, Atlanta, GA 30329. Internet: <http://www.nmtcb.org>

# Nursing, Psychiatric, and Home Health Aides

(O\*NET 31-1011.00, 31-1012.00, 31-1013.00)

## Significant Points

- Job prospects for nursing and home health aides will be very good because of fast growth and high replacement needs in these large occupations.
- Minimum education or training is generally required for entry-level jobs, but earnings are low.

## Nature of the Work

Nursing and psychiatric aides help care for physically or mentally ill, injured, disabled, or infirm individuals confined to hospitals, nursing and personal care facilities, and mental health settings. Home health aides duties are similar, but they work in patients' homes or residential care facilities.

*Nursing aides*, also known as nursing assistants, geriatric aides, unlicensed assistive personnel, or hospital attendants, perform routine tasks under the supervision of nursing and medical staff. They answer patients' call bells, deliver messages, serve meals, make beds, and help patients eat, dress, and bathe. Aides also may provide skin care to patients; take temperatures, pulse, respiration, and blood pressure; and help patients get in and out of bed and walk. They also may escort patients to operating and examining rooms, keep patients' rooms neat, set up equipment, store and move supplies, or assist with some procedures. Aides observe patients' physical, mental, and emotional conditions and report any change to the nursing or medical staff.

Nursing aides employed in nursing homes often are the principal caregivers, having far more contact with residents than other members of the staff. Because some residents may stay in a nursing home for months or even years, aides develop ongoing relationships with them and interact with them in a positive, caring way.

*Psychiatric aides*, also known as mental health assistants or psychiatric nursing assistants, care for mentally impaired or emotionally disturbed individuals. They work under a team that may include psychiatrists, psychologists, psychiatric nurses, social workers, and therapists. In addition to helping patients dress, bathe, groom, and eat, psychiatric aides socialize with them and lead them in educational and recreational activities. Psychiatric aides may play games such as cards with the patients, watch television with them, or participate in group activities such as sports or field trips. They observe patients and report any physical or behavioral signs that might be important for the professional staff to know. They accompany patients to and from examinations and treatments. Because they have such close contact with patients, psychiatric aides can have a great deal of influence on their outlook and treatment.

*Home health aides* help elderly, convalescent, or disabled persons live in their own homes instead of in a health facility. Under the direction of nursing or medical staff, they provide health-related services, such as administering oral medications. (Personal and home care aides, who provide mainly housekeeping and routine personal care services, are discussed elsewhere in the *Handbook*.) Like nursing aides, home health aides may check pulse, temperature, and respiration; help with simple prescribed exercises; keep patients' rooms neat; and help patients move from bed, bathe, dress, and groom. Occasionally, they change nonsterile dressings, give massages and alcohol rubs, or assist with braces and artificial limbs. Experienced home health aides also may assist with medical equipment such as ventilators, which help patients breathe.



*Aides help care for physically or mentally ill, injured, disabled, or infirm individuals.*

Most home health aides work with elderly or disabled persons who need more extensive care than family or friends can provide. Some help discharged hospital patients who have relatively short-term needs.

In home healthcare agencies, a registered nurse, physical therapist, or social worker usually assigns specific duties and supervises home health aides. Aides keep records of services performed and patients' condition and progress. They report changes in patients' conditions to the supervisor or case manager.

## Working Conditions

Most full-time aides work about 40 hours a week, but because patients need care 24 hours a day, some aides work evenings, nights, weekends, and holidays. Many work part time. Aides spend many hours standing and walking, and they often face heavy workloads. Because they may have to move patients in and out of bed or help them stand or walk, aides must guard against back injury. Aides also may face hazards from minor infections and major diseases, such as hepatitis, but can avoid infections by following proper procedures.

Aides often have unpleasant duties, such as emptying bedpans and changing soiled bed linens. The patients they care for may be disoriented, irritable, or uncooperative. Psychiatric aides must be prepared to care for patients whose illness may cause violent behavior. While their work can be emotionally demanding, many aides gain satisfaction from assisting those in need.

Home health aides may go to the same patient's home for months or even years. However, most aides work with a number of different patients, each job lasting a few hours, days, or weeks. Home health aides often visit multiple patients on the same day.

Home health aides generally work alone, with periodic visits by their supervisor. They receive detailed instructions explaining when to visit patients and what services to perform. Aides are individually responsible for getting to patients' homes, and they may spend a good portion of the working day traveling from one patient to another. Because mechanical lifting devices available in institutional settings are seldom available in patients' homes, home health aides are particularly susceptible to injuries resulting from overexertion when assisting patients.

## Employment

Nursing, psychiatric, and home health aides held about 2.1 million jobs in 2000. Nursing aides held about 1.4 million jobs, home

health aides held roughly 615,000 jobs, and psychiatric aides held about 65,000 jobs. About one-half of nursing aides worked in nursing homes, and about one-fourth worked in hospitals. Most home health aides were employed by home health agencies, visiting nurse associations, social services agencies, residential care facilities, and temporary-help firms. Others worked for home health departments of hospitals and nursing facilities, public health agencies, and community volunteer agencies. Most psychiatric aides worked in psychiatric units of general hospitals, psychiatric hospitals, State and county mental institutions, homes for mentally retarded and psychiatric patients, and community mental health centers.

**Training, Other Qualifications, and Advancement**

In many cases, neither a high school diploma nor previous work experience is necessary for a job as a nursing, psychiatric, or home health aide. A few employers, however, require some training or experience. Hospitals may require experience as a nursing aide or home health aide. Nursing homes often hire inexperienced workers who must complete a minimum of 75 hours of mandatory training and pass a competency evaluation program within 4 months of employment. Aides who complete the program are certified and placed on the State registry of nursing aides. Some States require psychiatric aides to complete a formal training program.

The Federal Government has enacted guidelines for home health aides whose employers receive reimbursement from Medicare. Federal law requires home health aides to pass a competency test covering 12 areas: Communication skills; documentation of patient status and care provided; reading and recording vital signs; basic infection control procedures; basic body functions; maintenance of a healthy environment; emergency procedures; physical, emotional, and developmental characteristics of patients; personal hygiene and grooming; safe transfer techniques; normal range of motion and positioning; and basic nutrition.

A home health aide may take training before taking the competency test. Federal law suggests at least 75 hours of classroom and practical training supervised by a registered nurse. Training and testing programs may be offered by the employing agency, but must meet the standards of the Health Care Financing Administration. Training programs vary depending upon State regulations.

The National Association for Home Care offers national certification for home health aides. The certification is a voluntary demonstration that the individual has met industry standards.

Nursing aide training is offered in high schools, vocational-technical centers, some nursing homes, and some community colleges. Courses cover body mechanics, nutrition, anatomy and physiology, infection control, communication skills, and resident rights. Personal care skills such as how to help patients bathe, eat, and groom also are taught.

Some facilities, other than nursing homes, provide classroom instruction for newly hired aides, while others rely exclusively on informal on-the-job instruction from a licensed nurse or an experienced aide. Such training may last several days to a few months. From time to time, aides may also attend lectures, workshops, and in-service training.

These occupations can offer individuals an entry into the world of work. The flexibility of night and weekend hours also provides high school and college students a chance to work during the school year.

Applicants should be tactful, patient, understanding, healthy, emotionally stable, dependable, and have a desire to help people. They should also be able to work as part of a team, have good communication skills, and be willing to perform repetitive, routine tasks. Home health aides should be honest, and discreet because they work in private homes.

Aides must be in good health. A physical examination, including State regulated tests such as those for tuberculosis, may be required.

Opportunities for advancement within these occupations are limited. To enter other health occupations, aides generally need additional formal training. Some employers and unions provide opportunities by simplifying the educational paths to advancement. Experience as an aide can also help individuals decide whether to pursue a career in the healthcare field.

**Job Outlook**

Overall employment of nursing, psychiatric, and home health aides is projected to grow faster than the average through the year 2010, although individual occupational growth rates vary. *Home health aides* are expected to grow the fastest, as a result of growing demand for home healthcare from an aging population and efforts to contain healthcare costs by moving patients out of hospitals and nursing facilities as quickly as possible. Consumer preference for care in the home and improvements in medical technologies for in-home treatment also will contribute to much faster than average employment growth for home health aides.

*Nursing aide* employment will not grow as fast as home health aide employment, largely because nursing aides are concentrated in the relatively slower-growing nursing home sector. Nevertheless, employment of nursing aides is expected to grow faster than the average for all occupations in response to increasing emphasis on rehabilitation and the long-term care needs of a rapidly growing elderly population. Financial pressure on hospitals to discharge patients as soon as possible should produce more nursing home admissions. Modern medical technology will also increase the employment of nursing aides. This technology, while saving and extending more lives, increases the need for long-term care provided by aides.

Employment of *psychiatric aides*—the smallest of the three occupations—is expected to grow as fast as the average. The number of jobs for psychiatric aides in hospitals, where one-half of psychiatric aides work, will decline due to attempts to contain costs by limiting inpatient psychiatric treatment. Employment in other sectors will rise in response to growth in the number of older persons—many of whom will require mental health services, increasing public acceptance of formal treatment for drug abuse and alcoholism, and a lessening of the stigma attached to those receiving mental health care.

Numerous openings for nursing and home health aides will arise from a combination of fast growth and high replacement needs for these large occupations. Turnover is high, a reflection of modest entry requirements, low pay, high physical and emotional demands, and lack of advancement opportunities. For these same reasons, many people are unwilling to perform this kind of work. Therefore, persons who are interested in this work and suited for it should have excellent job opportunities.

**Earnings**

Median hourly earnings of nursing aides, orderlies, and attendants were \$8.89 in 2000. The middle 50 percent earned between \$7.51 and \$10.59 an hour. The lowest 10 percent earned less than \$6.48, and the highest 10 percent earned more than \$12.69 an hour. Median hourly earnings in the industries employing the largest numbers of nursing aides, orderlies, and attendants in 2000 were as follows:

Personnel supply services .....	\$9.82
Local government .....	9.66
Hospitals .....	9.42
Nursing and personal care facilities .....	8.61
Residential care .....	7.96



Median hourly earnings of psychiatric aides were \$10.45 in 2000. The middle 50 percent earned between \$8.38 and \$13.02 an hour. The lowest 10 percent earned less than \$7.10, and the highest 10 percent earned more than \$15.50 an hour. Median hourly earnings of psychiatric aides in 2000 were \$12.61 in State government and \$10.50 in hospitals.

Nursing and psychiatric aides in hospitals generally receive at least 1 week's paid vacation after 1 year of service. Paid holidays and sick leave, hospital and medical benefits, extra pay for late-shift work, and pension plans also are available to many hospital and some nursing home employees.

Median hourly earnings of home health aides were \$8.23 in 2000. The middle 50 percent earned between \$7.13 and \$9.88 an hour. The lowest 10 percent earned less than \$6.14, and the highest 10 percent earned more than \$11.93 an hour. Median hourly earnings in the industries employing the largest numbers of home health aides in 2000 were as follows:

Nursing and personal care facilities .....	\$8.65
Personnel supply services .....	8.60
Residential care .....	8.16
Home health care services .....	7.91
Individual and family services .....	7.89

Home health aides receive slight pay increases with experience and added responsibility. They usually are paid only for the time worked in the home; they normally are not paid for travel time between jobs. Most employers hire only on-call hourly workers and provide no benefits.

### Related Occupations

Nursing, psychiatric, and home health aides help people who need routine care or treatment. So do childcare workers, medical assistants, occupational therapist assistants and aides, personal and home care aides, and physical therapist assistants and aides.

### Sources of Additional Information

Information about employment opportunities may be obtained from local hospitals, nursing homes, home healthcare agencies, psychiatric facilities, State boards of nursing, and local offices of the State employment service.

General information about training and referrals to State and local agencies about opportunities for home health aides, a list of relevant publications, and information on certification are available from:

- National Association for Home Care, 228 7th St. SE., Washington, DC 20003. Internet: <http://www.nahc.org>

## Occupational Health and Safety Specialists and Technicians

(O\*NET 29-9011.00, 29-9012.00)

### Significant Points

- Almost half of occupational health and safety specialists and technicians work in Federal, State, and local government agencies that enforce rules on health and safety.
- For positions as specialists, many employers, including the Federal Government, require 4-year college degrees in safety or a related field.

### Nature of the Work

Occupational health and safety specialists and technicians, also known as *occupational health and safety inspectors* and *industrial hygienists*, help keep workplaces safe and workers unscathed. They promote occupational health and safety within organizations by developing safer, healthier, and more efficient ways of working. (Industrial engineers, including health and safety—who have similar goals—are discussed elsewhere in the *Handbook*.) *Occupational health and safety specialists* analyze work environments and design programs to control, eliminate, and prevent disease or injury caused by chemical, physical, and biological agents or ergonomic factors. They may conduct inspections and enforce adherence to laws, regulations, or employer policies governing worker health and safety. *Occupational health and safety technicians* collect data on work environments for analysis by occupational health and safety specialists. Usually working under the supervision of specialists, they help implement and evaluate programs designed to limit risks to workers.

Occupational health and safety specialists and technicians identify hazardous conditions and practices. Sometimes, they develop methods to predict hazards from experience, historical data, and other information sources. Then they identify potential hazards in existing or future systems, equipment, products, facilities, or processes. After reviewing the causes or effects of hazards, they evaluate the probability and severity of accidents that may result. For example, they might uncover patterns in injury data that implicate a specific cause such as system failure, human error, incomplete or faulty decision making, or a weakness in existing policies or practices. Then they develop and help enforce a plan to eliminate hazards, conducting training sessions for management, supervisors, and workers on health and safety practices and regulations, as necessary. Lastly, they may check on the progress of the safety plan after its implementation. If improvements are not satisfactory, a new plan might be designed and put into practice.

Many occupational health and safety specialists inspect and test machinery and equipment, such as lifting devices, machine shields, or scaffolding, to ensure they meet appropriate safety regulations. They may check that personal protective equipment, such as masks, respirators, safety glasses, or safety helmets, is being used in workplaces according to regulations. They also check that dangerous materials are stored correctly. They test and identify work areas for potential accident and health hazards, such as toxic fumes and explosive gas-air mixtures, and may implement appropriate control measures, such as adjustments to ventilation systems. Their investigations might involve talking with workers and observing their work, as well as inspecting elements in their work environment, such as lighting, tools, and equipment.

To measure and control hazardous substances, such as the noise or radiation levels, occupational health and safety specialists and technicians prepare and calibrate scientific equipment. Samples of dust, gases, vapors, and other potentially toxic materials must be collected and handled properly to ensure safety and accurate test results.

If an accident occurs, occupational health and safety specialists help investigate unsafe working conditions, study possible causes, and recommend remedial action. Some occupational health and safety specialists and technicians assist with the rehabilitation of workers after accidents and injuries, and make sure they return to work successfully.

Frequent communication with management may be necessary to report on the status of occupational health and safety programs. Consultation with engineers or physicians also may be required.



*Almost half of occupational health and safety specialists and technicians work for Federal, State, or local government agencies.*

Occupational health and safety specialists prepare reports including observations, analysis of contaminants, and recommendation for control and correction of hazards. Those who develop expertise in certain areas may develop occupational health and safety systems, including policies, procedures, and manuals.

### **Working Conditions**

Occupational health and safety specialists and technicians work with many different people in a variety of environments. Their jobs often involve considerable fieldwork, and some travel frequently. Many occupational health and safety specialists and technicians work long and often irregular hours.

Occupational health and safety specialists and technicians may experience unpleasant, stressful, and dangerous working conditions. For example, health and safety inspectors are exposed to many of the same physically strenuous conditions and hazards as industrial employees, and the work may be performed in unpleasant, stressful, and dangerous working conditions. Health and safety inspectors may find themselves in adversarial roles when the organization or individual being inspected objects to the process or its consequences.

### **Employment**

Occupational health and safety specialists and technicians held about 35,000 jobs in 2000. The Federal Government—chiefly the Department of Labor—employed 8 percent, State governments employed 17 percent, and local governments employed 19 percent. The remainder were employed throughout the private sector in schools, hospitals, management consulting firms, public utilities, and manufacturing firms.

Within the Federal government, most jobs are as Occupational Health and Safety Administration (OSHA) inspectors, who enforce U.S. Department of Labor regulations that ensure adequate safety principles, practices, and techniques are applied in workplaces. Employers may be fined for violation of OSHA standards. Within the U.S. Department of Health and Human Services, occupational health and safety specialists working for the National Institute of Occupational Safety and Health (NIOSH) provide private companies with an avenue to evaluate the health and safety of their employees without the risk of being fined. Most large government agencies also employ occupational health and

safety specialists and technicians who work to protect agency employees.

Most private companies either employ their own safety personnel or contract safety professionals to ensure OSHA compliance, as needed.

### **Training, Other Qualifications, and Advancement**

Requirements include a combination of education, experience, and passing scores on written examinations. Many employers, including the Federal Government, require a 4-year college degree in safety or a related field for some positions. Experience as a safety professional is also a prerequisite for many positions.

All occupational health and safety specialists and technicians are trained in the applicable laws or inspection procedures through some combination of classroom and on-the-job training. In general, people who want to enter this occupation should be responsible and like detailed work. Occupational health and safety specialists and technicians should be able to communicate well. Recommended high school courses include English, chemistry, biology, and physics.

Certification is available through the Board of Certified Safety Professionals (BCSP) and the American Board of Industrial Hygiene (ABIH). The BCSP offers the Certified Safety Professional (CSP) credential, while the ABIH proffers the Certified Industrial Hygienist (CIH) credential. Also, the Council on Certification of Health, Environmental, and Safety Technologists, a joint effort between the BCSP and ABIH, awards the Occupational Health and Safety Technologist (OHST) credential. Requirements for the OHST credential are less stringent than those for the CSP or CIH credentials. Once education and experience requirements have been met, certification may be obtained through an examination. Continuing education is required for recertification. Although voluntary, many employers encourage certification.

Federal Government occupational health and safety specialists and technicians whose job performance is satisfactory advance through their career ladder to a specified full-performance level. For positions above this level, usually supervisory positions, advancement is competitive and based on agency needs and individual merit. Advancement opportunities in State and local governments and the private sector are often similar to those in the Federal Government.

With additional experience or education, promotion to a managerial position is possible. Research or related teaching positions at the college level require advanced education.

### **Job Outlook**

Employment of occupational health and safety specialists and technicians is expected to grow about as fast as the average for all occupations through 2010, reflecting a balance of continuing public demand for a safe and healthy work environment against the desire for smaller government and fewer regulations. Additional job openings will arise from the need to replace those who transfer to other occupations, retire, or leave the labor force for other reasons. In private industry, employment growth will reflect industry growth and the continuing self-enforcement of government and company regulations and policies.

Employment of occupational health and safety specialists and technicians is seldom affected by general economic fluctuations. Federal, State, and local governments, which employ almost half of all specialists and technicians, provide considerable job security.

## Earnings

Median annual earnings of occupational health and safety specialists and technicians were \$42,750 in 2000. The middle 50 percent earned between \$32,060 and \$54,880. The lowest 10 percent earned less than \$23,780, while the highest 10 percent earned over \$67,760. Median annual earnings of occupational health and safety specialists and technicians in 2000 were \$41,330 in local government and \$41,110 in State government.

Most occupational health and safety specialists and technicians work for Federal, State, and local governments or in large private firms, most of which generally offer more generous benefits than do smaller firms.

## Related Occupations

Occupational health and safety specialists and technicians ensure that laws and regulations are obeyed. Others who enforce laws and regulations include agricultural inspectors, construction and building inspectors, correctional officers, financial examiners, fire inspectors, police and detectives, and transportation inspectors.

## Sources of Additional Information

Information about jobs in Federal, State, and local government as well as in private industry is available from the States' employment service offices.

For information on a career as an industrial hygienist and a list of colleges and universities offering programs in industrial hygiene, contact:

➤ American Industrial Hygiene Association, 2700 Prosperity Ave., Suite 250, Fairfax, VA 22031. Internet: <http://www.aiha.org>

For a list of colleges and universities offering safety and related degrees, including correspondence courses, contact:

➤ American Society of Safety Engineers, 1800 E Oakton St., Des Plaines, IL 60018. Internet: <http://www.asse.org>

For information on the Certified Safety Professional credential, contact:

➤ Board of Certified Safety Professionals, 208 Burwash Ave., Savoy, IL 61874. Internet: <http://www.bcsp.org>

For information on the Certified Industrial Hygiene credential, contact:

➤ American Board of Industrial Hygiene, 6015 West St. Joseph, Suite 102, Lansing, MI 48917. Internet: <http://www.abih.org>

For information on the Occupational Health and Safety Technologist credential, contact:

➤ Council on Certification of Health, Environmental, and Safety Technologists, 208 Burwash Ave., Savoy, IL 61874. Internet: <http://www.cchest.org>

For additional career information, contact:

➤ U.S. Department of Health and Human Services, Center for Disease Control and Prevention, National Institute of Occupational Safety and Health, Hubert H. Humphrey Bldg., 200 Independence Ave. SW., Room 715H, Washington, DC 20201. Internet: <http://www.cdc.gov/niosh/homepage.html>

➤ U.S. Department of Labor, Occupational Safety and Health Administration, 200 Constitution Ave. NW., Washington, DC 20210. Internet: <http://www.osha.gov>

Information on obtaining positions as occupational health and safety specialists and technicians with the Federal Government is available from the Office of Personnel Management through a telephone-based system. Consult your telephone directory under U.S. Government for a local number or call (912) 757-3000; Federal Relay Service: (800) 877-8339. The first number is not tollfree, and charges may result. Information also is available from the Internet site: <http://www.usajobs.opm.gov>.

# Occupational Therapist Assistants and Aides

(O\*NET 31-2011.00, 31-2012.00)

## Significant Points

- Certified occupational therapist assistants must complete an associate's degree or certificate program. In contrast, occupational therapist aides usually receive most of their training on the job.
- Aides are not licensed, so by law they are not allowed to perform as wide a range of tasks as occupational therapist assistants do.
- Employment is projected to increase much faster than the average, as rapid growth in the number of middle-aged and elderly individuals increases the demand for therapeutic services.

## Nature of the Work

Occupational therapist assistants and aides work under the direction of occupational therapists to provide rehabilitative services to persons with mental, physical, emotional, or developmental impairments. The ultimate goal is to improve clients' quality of life by helping them compensate for limitations. For example, occupational therapist assistants help injured workers reenter the labor force by helping them improve their motor skills or help persons with learning disabilities increase their independence, by teaching them to prepare meals or use public transportation.

*Occupational therapist assistants* help clients with rehabilitative activities and exercises outlined in a treatment plan developed in collaboration with an occupational therapist. Activities range from teaching the proper method of moving from a bed into a wheelchair, to the best way to stretch and limber the muscles of the hand. Assistants monitor an individual's activities to make sure they are performed correctly and to provide encouragement. They also record their client's progress for use by the occupational therapist. If the treatment is not having the intended effect, or the client is not improving as expected, the therapist may alter the treatment program in hopes of obtaining better results. In addition, occupational therapist assistants document billing of the client's health insurance provider.



*An occupational therapist assistant helps a patient restore mobility in her hand.*

*Occupational therapist aides* typically prepare materials and assemble equipment used during treatment and are responsible for a range of clerical tasks. Duties can include scheduling appointments, answering the telephone, restocking or ordering depleted supplies, and filling out insurance forms or other paperwork. Aides are not licensed, so by law they are not allowed to perform as wide a range of tasks as occupational therapist assistants.

### **Working Conditions**

The hours and days that occupational therapist assistants and aides work vary, depending on the facility and whether they are full or part-time employees. Many outpatient therapy offices and clinics have evening and weekend hours, to help coincide with patients' personal schedules.

Occupational therapist assistants and aides need to have a moderate degree of strength, due to the physical exertion required in assisting patients with their treatment. For example, in some cases, assistants and aides need to help lift patients. Additionally, constant kneeling, stooping, and standing for long periods all are part of the job.

### **Employment**

Occupational therapist assistants and aides held 25,000 jobs in 2000. Occupational therapist assistants held about 17,000 jobs, and occupational therapist aides held about 8,500. About 30 percent of assistants and aides worked in hospitals, 25 percent worked in offices of occupational therapists, and 20 percent in nursing and personal care facilities. The remainder primarily worked in offices and clinics of physicians, social services agencies, outpatient rehabilitation centers, and home health agencies.

### **Training, Other Qualifications, and Advancement**

Persons must complete an associate's degree or certificate program from an accredited community college or technical school to qualify for occupational therapist assistant jobs. In contrast, occupational therapist aides usually receive most of their training on the job.

There were 185 accredited occupational therapist assistant programs in the United States in 2000. The first year of study typically involves an introduction to healthcare, basic medical terminology, anatomy, and physiology. In the second year, courses are more rigorous and usually include occupational therapist courses in areas such as mental health, gerontology, and pediatrics. Students also must complete supervised fieldwork in a clinic or community setting. Applicants to occupational therapist assistant programs can improve their chances of admission by taking high school courses in biology and health and by performing volunteer work in nursing homes, occupational or physical therapist's offices, or elsewhere in the healthcare field.

Occupational therapist assistants are regulated in most States, and must pass a national certification examination after they graduate. Those who pass the test are awarded the title of certified occupational therapist assistant.

Occupational therapist aides usually receive most of their training on the job. Qualified applicants must have a high school diploma, strong interpersonal skills, and a desire to help people in need. Applicants may increase their chances of getting a job by volunteering their services, thus displaying initiative and aptitude to the employer.

Assistants and aides must be responsible, patient, and willing to take directions and work as part of a team. Furthermore, they should be caring and want to help people who are not able to help themselves.

### **Job Outlook**

Employment of occupational therapist assistants and aides is expected to grow much faster than the average for all occupations through 2010. Federal legislation imposing limits on reimbursement for therapy services may adversely affect the job market for occupational therapist assistants and aides in the near term. However, over the long run, demand for occupational therapist assistants and aides will continue to rise, with growth in the number of individuals with disabilities or limited function. Growth will result from an increasing population in older age groups, including the baby-boom generation, which increasingly needs occupational therapy services as they become older. Demand also will result from advances in medicine that allow more people with critical problems to survive and then need rehabilitative therapy. Third-party payers, concerned with rising health care costs may begin to encourage occupational therapists to delegate more of the hands-on therapy work to occupational therapist assistants and aides. By having assistants and aides work more closely with clients under the guidance of a therapist, the cost of therapy should be more modest than otherwise.

### **Earnings**

Median annual earnings of occupational therapist assistants were \$34,340 in 2000. The middle 50 percent earned between \$29,280 and \$40,690. The lowest 10 percent earned less than \$23,970, and the highest 10 percent earned more than \$45,370. Median annual earnings of occupational therapist assistants in 2000 were \$33,390 in hospitals.

Median annual earnings of occupational therapist aides were \$20,710 in 2000. The middle 50 percent earned between \$16,510 and \$28,470. The lowest 10 percent earned less than \$14,370, and the highest 10 percent earned more than \$35,900.

### **Related Occupations**

Occupational therapist assistants and aides work under the direction of occupational therapists. Other occupations in the healthcare field that work under the supervision of professionals include dental assistants, medical assistants, pharmacy technicians, and physical therapist assistants and aides.

### **Sources of Additional Information**

For information on a career as an occupational therapist assistant and a list of accredited programs, contact:

► The American Occupational Therapy Association, 4720 Montgomery Ln., P.O. Box 31220, Bethesda, MD 20824-1220. Internet: <http://www.aota.org>

---

## **Ophthalmic Laboratory Technicians**

---

(O\*NET 51-9083.01, 51-9083.02)

---

### **Significant Points**

- Nearly all ophthalmic laboratory technicians learn their skills on the job.
- Increasing use of automated equipment will result in relatively slow job growth.
- Only a small number of job openings will be created each year because the occupation is small and slower-than-average growth is expected.

### **Nature of the Work**

Ophthalmic laboratory technicians—also known as *manufacturing opticians*, *optical mechanics*, or *optical goods workers*—make prescription eyeglass or contact lenses. Prescription lenses are curved



in such a way that light is correctly focused onto the retina of the patient's eye, improving vision. Some ophthalmic laboratory technicians manufacture lenses for other optical instruments, such as telescopes and binoculars. Ophthalmic laboratory technicians cut, grind, edge, and finish lenses according to specifications provided by dispensing opticians, optometrists, or ophthalmologists, and may insert lenses into frames to produce finished glasses. Although some lenses still are produced by hand, technicians increasingly use automated equipment to make lenses.

Ophthalmic laboratory technicians should not be confused with workers in other vision care occupations. Ophthalmologists and optometrists are "eye doctors" who examine eyes, diagnose and treat vision problems, and prescribe corrective lenses. Ophthalmologists are physicians who perform eye surgery. Dispensing opticians, who also may do work described here, help patients select frames and lenses, and adjust finished eyeglasses. (See the statement on physicians and surgeons, which includes ophthalmologists, as well as the statements on optometrists and opticians, dispensing, elsewhere in the *Handbook*.)

Ophthalmic laboratory technicians read prescription specifications, then select standard glass or plastic lens blanks and mark them to indicate where the curves specified on the prescription should be ground. They place the lens in the lens grinder, set the dials for the prescribed curvature, and start the machine. After a minute or so, the lens is ready to be "finished" by a machine that rotates it against a fine abrasive to grind it and smooth out rough

edges. The lens is then placed in a polishing machine with an even finer abrasive, to polish it to a smooth, bright finish.

Next, the technician examines the lens through a lensometer, an instrument similar in shape to a microscope, to make sure the degree and placement of the curve is correct. The technician then cuts the lenses and bevels the edges to fit the frame, dips each lens into dye if the prescription calls for tinted or coated lenses, polishes the edges, and assembles the lenses and frame parts into a finished pair of glasses.

In small laboratories, technicians usually handle every phase of the operation. In large ones, technicians may be responsible for operating computerized equipment where virtually every phase of the operation is automated. Technicians also inspect the final product for quality and accuracy.

### Working Conditions

Ophthalmic laboratory technicians work in relatively clean and well-lighted laboratories and have limited contact with the public. Surroundings are relatively quiet despite the humming of machines. At times, technicians wear goggles to protect their eyes, and may spend a great deal of time standing.

Most ophthalmic laboratory technicians work a 5-day, 40-hour week, which may include weekends, evenings, or occasionally some overtime. Some work part time.

Ophthalmic laboratory technicians need to take precautions against the hazards associated with cutting glass, handling chemicals, and working near machinery.

### Employment

Ophthalmic laboratory technicians held about 32,000 jobs in 2000. Thirty-one percent were in retail optical stores that manufacture and sell prescription glasses and contact lenses, and 23 percent were in optical laboratories. These laboratories manufacture eyewear and contact lenses for sale by retail stores, as well as by ophthalmologists and optometrists. Most of the rest were in wholesalers or in optical laboratories that manufacture lenses for other optical instruments, such as telescopes and binoculars.

### Training, Other Qualifications, and Advancement

Nearly all ophthalmic laboratory technicians learn their skills on the job. Employers filling trainee jobs prefer applicants who are high school graduates. Courses in science, mathematics, and computers are valuable; manual dexterity and the ability to do precision work are essential.

Technician trainees producing lenses by hand start on simple tasks such as marking or blocking lenses for grinding, then progress to lens grinding, lens cutting, edging, beveling, and eyeglass assembly. Depending on individual aptitude, it may take up to 6 months to become proficient in all phases of the work.

Technicians using automated systems will find computer skills valuable. Training is completed on the job and varies in duration depending on the type of machinery and individual aptitude.

A very small number of ophthalmic laboratory technicians learn their trade in the Armed Forces or in the few programs in optical technology offered by vocational-technical institutes or trade schools. These programs have classes in optical theory, surfacing and lens finishing, and the reading and applying of prescriptions. Programs vary in length from 6 months to 1 year and award certificates or diplomas.

Ophthalmic laboratory technicians can become supervisors and managers. Some technicians become dispensing opticians, although further education or training generally is required.



*A contact lens manufacturing worker grinds lenses according to prescription.*

## Job Outlook

Overall employment of ophthalmic laboratory technicians is expected to grow more slowly than the average for all occupations through the year 2010. Employment is expected to increase slowly in manufacturing as firms invest in automated machinery.

Demographic trends make it likely that many more Americans will need vision care in the years ahead. Not only will the population grow, but also the proportion of middle-aged and older adults is projected to increase rapidly. Middle age is a time when many people use corrective lenses for the first time, and elderly persons usually require more vision care than others.

Fashion, too, influences demand. Frames come in a variety of styles and colors—encouraging people to buy more than one pair. Demand also is expected to grow in response to the availability of new technologies that improve the quality and look of corrective lenses, such as antireflective coatings and bifocal lenses without the line visible in traditional bifocals.

Most job openings will arise from the need to replace technicians who transfer to other occupations or leave the labor force. However, only a small number of job openings will be created each year because the occupation is small.

## Earnings

Median hourly earnings of ophthalmic laboratory technicians were \$9.88 in 2000. The middle 50 percent earned between \$8.25 and \$12.07 an hour. The lowest 10 percent earned less than \$7.19, and the highest 10 percent earned more than \$14.71 an hour. In 2000, median hourly earnings of ophthalmic laboratory technicians were \$10.25 in ophthalmic goods manufacturing and \$9.79 in retail stores, not elsewhere classified, including optical goods stores.

## Related Occupations

Workers in other precision production occupations include dental laboratory technicians, orthotists and prosthetists, and precision instrument and equipment repairers.

## Sources of Additional Information

For a list of accredited programs in ophthalmic laboratory technology, contact:

► Commission on Opticianry Accreditation, 7023 Little River Turnpike, Suite 207, Annandale, VA 22003. Internet: <http://www.coaccreditation.com>

State employment service offices can provide information about job openings for ophthalmic laboratory technicians.

*Handbook.* See the statement on physicians and surgeons for information about ophthalmologists.)

Dispensing opticians examine written prescriptions to determine lens specifications. They recommend eyeglass frames, lenses, and lens coatings after considering the prescription and the customer's occupation, habits, and facial features. Dispensing opticians measure clients' eyes, including the distance between the centers of the pupils and the distance between the eye surface and the lens. For customers without prescriptions, dispensing opticians may use a lensometer to record the present eyeglass prescription. They also may obtain a customer's previous record, or verify a prescription with the examining optometrist or ophthalmologist.

Dispensing opticians prepare work orders that give ophthalmic laboratory technicians information needed to grind and insert lenses into a frame. The work order includes lens prescriptions and information on lens size, material, color, and style. Some dispensing opticians grind and insert lenses themselves. After the glasses are made, dispensing opticians verify that the lenses have been ground to specifications. Then they may reshape or bend the frame, by hand or using pliers, so that the eyeglasses fit the customer properly and comfortably. Some also fix, adjust, and refit broken frames. They instruct clients about adapting to, wearing, or caring for eyeglasses.

Some dispensing opticians specialize in fitting contacts, artificial eyes, or cosmetic shells to cover blemished eyes. To fit contact lenses, dispensing opticians measure eye shape and size, select the type of contact lens material, and prepare work orders specifying the prescription and lens size. Fitting contact lenses requires considerable skill, care, and patience. Dispensing opticians observe customers' eyes, corneas, lids, and contact lenses with special instruments and microscopes. During several visits, opticians show customers how to insert, remove, and care for their contacts, and ensure the fit is correct.

Dispensing opticians keep records on customer prescriptions, work orders, and payments; track inventory and sales; and perform other administrative duties.

## Working Conditions

Dispensing opticians work indoors in attractive, well-lighted, and well-ventilated surroundings. They may work in medical offices or small stores where customers are served one at a time, or in large stores where several dispensing opticians serve a number of customers at once. Opticians spend a lot of time on their feet. If they prepare lenses, they need to take precautions against the hazards associated with glass cutting, chemicals, and machinery.

# Opticians, Dispensing

(O\*NET 29-2081.00)

## Significant Points

- Most dispensing opticians receive training on-the-job or through apprenticeships lasting 2 or more years; 22 States require a license.
- Projected employment growth reflects steadfast demand for corrective lenses and trends in fashion.
- The number of job openings will be relatively small because the occupation is small.

## Nature of Work

Dispensing opticians fit eyeglasses and contact lenses, following prescriptions written by ophthalmologists or optometrists. (The work of optometrists is described in a statement elsewhere in the



*A dispensing optician ensures that eyeglass frames fit properly and comfortably.*

Most dispensing opticians work a 40-hour week, although some work longer hours. Those in retail stores may work evenings and weekends. Some work part time.

### Employment

Dispensing opticians held about 68,000 jobs in 2000. Almost half worked for ophthalmologists or optometrists who sell glasses directly to patients. Many also work in retail optical stores that offer one-stop shopping. Customers may have their eyes examined, choose frames, and have glasses made on the spot. Some work in optical departments of drug and department stores.

### Training, Other Qualifications, and Advancement

Employers usually hire individuals with no background in opticianry or those who have worked as ophthalmic laboratory technicians and then provide the required training. (See the statement on ophthalmic laboratory technicians elsewhere in the *Handbook*.) Most dispensing opticians receive training on-the-job or through apprenticeships lasting 2 or more years. Some employers, however, seek people with postsecondary training in opticianry.

Knowledge of physics, basic anatomy, algebra, geometry, and mechanical drawing is particularly valuable because training usually includes instruction in optical mathematics, optical physics, and the use of precision measuring instruments and other machinery and tools. Dispensing opticians deal directly with the public, so they should be tactful, pleasant, and communicate well. Manual dexterity and the ability to do precision work are essential.

Large employers usually offer structured apprenticeship programs, and small employers provide more informal on-the-job training. In the 22 States that require dispensing opticians to be licensed, individuals without postsecondary training work from 2 to 4 years as apprentices. Apprenticeship or formal training is offered in most States as well.

Apprentices receive technical training and learn office management and sales. Under the supervision of an experienced optician, optometrist, or ophthalmologist, apprentices work directly with patients, fitting eyeglasses and contact lenses. In the 21 States requiring licensure, information about apprenticeships and licensing procedures is available from the State board of occupational licensing.

Formal opticianry training is offered in community colleges and a few colleges and universities. In 2000, the Commission on Opticianry Accreditation accredited 25 programs that awarded 2-year associate degrees in opticianry. There also are shorter programs of 1 year or less. Some States that offer a license to dispensing opticians allow graduates to take the licensure exam immediately upon graduation; others require a few months to a year of experience.

Dispensing opticians may apply to the American Board of Opticianry (ABO) and the National Contact Lens Examiners (NCLE) for certification of their skills. Certification must be renewed every 3 years through continuing education. Those licensed in States where licensing renewal requirements include continuing education credits may use proof of their renewed State license to meet the recertification requirements of the ABO. Likewise, the NCLE will accept proof of license renewal from any State that has contact lens requirements.

Many experienced dispensing opticians open their own optical stores. Others become managers of optical stores or sales representatives for wholesalers or manufacturers of eyeglasses or lenses.

### Job Outlook

Employment of dispensing opticians is expected to increase about as fast as the average for all occupations through 2010 as demand

grows for corrective lenses. The number of middle-aged and elderly persons is projected to increase rapidly. Middle age is a time when many individuals use corrective lenses for the first time, and elderly persons generally require more vision care than others.

Fashion, too, influences demand. Frames come in a growing variety of styles and colors—encouraging people to buy more than one pair. Demand also is expected to grow in response to the availability of new technologies that improve the quality and look of corrective lenses, such as anti-reflective coatings and bifocal lenses without the line visible in old-style bifocals. Improvements in bifocal, extended wear, and disposable contact lenses also will spur demand.

The need to replace those who leave the occupation will result in additional job openings. Nevertheless, the total number of job openings will be relatively small because the occupation is small. This occupation is vulnerable to changes in the business cycle because eyewear purchases often can be deferred for a time. Employment of opticians can fall somewhat during economic downturns.

### Earnings

Median annual earnings of dispensing opticians were \$24,430 in 2000. The middle 50 percent earned between \$19,200 and \$31,770. The lowest 10 percent earned less than \$15,900, and the highest 10 percent earned more than \$39,660. Median annual earnings in the industries employing the largest numbers of dispensing opticians in 2000 were as follows:

Offices and clinics of medical doctors .....	\$28,220
Retail stores, not elsewhere classified .....	25,120
Offices of other health practitioners .....	22,670
Department stores .....	21,410

### Related Occupations

Other workers who deal with customers and perform delicate work include camera and photographic equipment repairers, dental laboratory technicians, jewelers and precious stone and metal workers, locksmiths and safe repairers, ophthalmic laboratory technicians, orthotists and prosthetists, and watch repairers.

### Sources of Additional Information

For general information about a career as a dispensing optician and about continuing education, as well as a list of State licensing boards for opticianry, contact:

► Opticians Association of America, 7023 Little River Turnpike, Suite 207, Annandale, VA 22003. Internet: <http://www.opticians.org>

For general information about a career as a dispensing optician and a list of accredited training programs, contact:

► Commission on Opticianry Accreditation, 7023 Little River Turnpike, Suite 207, Annandale, VA 22003. Internet: <http://www.coaccreditation.com>

For general information on opticianry and a list of home-study programs, seminars, and review materials, contact:

► National Academy of Opticianry, 8401 Corporate Dr., Suite 605, Landover, MD 20785. Internet: <http://www.nao.org>

To learn about voluntary certification for opticians who fit spectacles, as well as State licensing boards of opticianry, contact:

► American Board of Opticianry, 6506 Loisdale Rd., Suite 209, Springfield, VA 22150. Internet: <http://www.abo.org>

For information on voluntary certification for dispensing opticians who fit contact lenses, contact:

► National Contact Lens Examiners, 6506 Loisdale Rd., Suite 209, Springfield, VA 22150. Internet: <http://www.abo.org>



# Pharmacy Aides

(O\*NET 31-9095.00)

## Significant Points

- Many pharmacy aides work evenings, weekends, and some holidays.
- Eight out of 10 jobs are in retail pharmacies.
- Job opportunities are expected to be good, especially for those with related work experience.

## Nature of the Work

Pharmacy aides help licensed pharmacists with administrative duties in running a pharmacy. Aides often are clerks or cashiers who primarily answer telephones, handle money, stock shelves, and perform other clerical duties. They work closely with pharmacy technicians. *Pharmacy technicians* usually perform more complex tasks than do assistants, although, in some States, their duties and job titles overlap. (See the statement on pharmacy technicians elsewhere in the *Handbook*.) Aides refer any questions regarding prescriptions, drug information, or health matters to a pharmacist. (See the statement on pharmacists elsewhere in the *Handbook*.)

Aides have several important duties that help the pharmacy to function smoothly. They may establish and maintain patient profiles, prepare insurance claim forms, and stock and take inventory of prescription and over-the-counter medications. Accurate recordkeeping is necessary to help avert a potentially dangerous drug interaction. Because many people have medical insurance to help pay for the prescription, it is essential that pharmacy aides efficiently and correctly correspond with the third-party insurance providers to obtain payment. They also maintain the inventory and inform the supervisor of stock needs so that the pharmacy has the vital medications for those who need them. Some also clean pharmacy equipment, help with the maintenance of equipment and supplies, and manage the cash register.

## Working Conditions

Pharmacy aides work in clean, organized, well-lighted, and well-ventilated areas. Most of their workday is spent on their feet. They may be required to lift heavy boxes or to use stepladders to retrieve supplies from high shelves.

Aides work the same hours as pharmacists. This includes evenings, nights, weekends, and some holidays. Because some

hospital and retail pharmacies are open 24 hours a day, aides may work varying shifts. There are many opportunities for part-time work in both retail and hospital settings.

## Employment

Pharmacy aides held about 57,000 jobs in 2000. Over 80 percent were in retail pharmacies, either independently owned or part of a drug store chain, grocery store, department store, or mass retailer. The vast majority of these are in drug stores. Thirteen percent were in hospitals, and the rest were in mail-order pharmacies, clinics, pharmaceutical wholesalers, and the Federal Government.

## Training, Other Qualifications, and Advancement

Most pharmacy aides receive informal on-the-job training, but employers favor those with at least a high school diploma. Prospective pharmacy aides with experience working as a cashier may have an advantage. Employers also prefer applicants with strong customer service and communication skills and experience managing inventories and using a computer. Aides entering the field need strong spelling, reading, and mathematics skills.

Successful pharmacy aides are organized, dedicated, friendly, and responsible. They should be willing and able to take directions. Candidates interested in becoming pharmacy aides cannot have prior records of drug or substance abuse. Strong interpersonal and communication skills are needed because there is a lot of interaction with patients, coworkers, and healthcare professionals. Teamwork is very important because aides are often required to work with technicians and pharmacists.

Pharmacy aides almost always are trained on the job. They may begin by observing a more experienced worker. After they become familiar with the store's equipment, policies, and procedures, they begin to work on their own. Once they become experienced workers, they are not likely to receive additional training, except when new equipment is introduced or when policies or procedures change.

To become a pharmacy aide, one should be able to perform repetitive work accurately. Aides need good basic mathematics skills and good manual dexterity. Because they deal constantly with the public, pharmacy aides should be neat in appearance and able to deal pleasantly and tactfully with customers. Some employers may prefer people with experience typing, handling money, or operating specialized equipment, including computers.

Advancement usually is limited, although some aides may decide to become a pharmacy technician or to enroll in pharmacy school to become a pharmacist.

## Job Outlook

Job opportunities for full- and part-time work are expected to be good, especially for aides with related work experience. Job openings will be created by employment growth and by the need to replace workers who transfer to other occupations or leave the labor force.

Employment of pharmacy aides is expected to grow about as fast as the average for all occupations through 2010 due to the increased pharmaceutical needs of a larger and older population and to the greater use of medication. The increased number of middle-aged and elderly people—who, on average, use more prescription drugs than do younger people—will spur demand for aides in all practice settings.

Cost-conscious insurers, pharmacies, and health systems will continue to emphasize the role of aides. As a result, pharmacy aides will assume responsibility for more routine tasks previously performed by pharmacists and pharmacy technicians, thereby giving pharmacists more time to interact with patients and affording technicians more time to prepare medications.



*Helping to keep complete and accurate medication records is an important duty of pharmacy aides.*



## Earnings

Median hourly earnings of pharmacy aides were \$8.52 in 2000. The middle 50 percent earned between \$7.16 and \$10.58; the lowest 10 percent earned less than \$6.12, and the highest 10 percent earned more than \$13.14. Median hourly earnings of pharmacy aides were \$8.02 in drug stores and proprietary stores, \$11.17 in hospitals, and \$8.47 in grocery stores in 2000.

## Related Occupations

The work of pharmacy aides is closely related to that of pharmacy technicians. Workers in other medical support occupations include dental assistants, licensed practical and licensed vocational nurses, medical transcriptionists, medical records and health information technicians, occupational therapist assistants and aides, physical therapist assistants and aides, and surgical technologists.

## Sources of Additional Information

For information on employment opportunities, contact local employers or local offices of the State employment service.

---

# Pharmacy Technicians

---

(O\*NET 29-2052.00)

## Significant Points

- Job opportunities are expected to be good, especially for those with certification or previous work experience.
- Many technicians work evenings, weekends, and some holidays.
- Two-thirds of all jobs are in retail pharmacies.

## Nature of the Work

Pharmacy technicians help licensed pharmacists provide medication and other healthcare products to patients. Technicians usually perform routine tasks to help prepare prescribed medication for patients, such as counting tablets and labeling bottles. Technicians refer any questions regarding prescriptions, drug information, or health matters to a *pharmacist*. (See the statement on pharmacists elsewhere in the *Handbook*.)

*Pharmacy aides* work closely with pharmacy technicians. They are often clerks or cashiers who primarily answer telephones, handle money, stock shelves, and perform other clerical duties. (See the statement on pharmacy aides elsewhere in the *Handbook*.) Pharmacy technicians usually perform more complex tasks than do pharmacy aides, although, in some States, their duties and job titles overlap.

Pharmacy technicians who work in retail pharmacies have varying responsibilities, depending on State rules and regulations. Technicians receive written prescriptions or requests for prescription refills from patients. They also may receive prescriptions sent electronically from the doctor's office. They must verify that the information on the prescription is complete and accurate. To prepare the prescription, technicians must retrieve, count, pour, weigh, measure, and sometimes mix the medication. Then, they prepare the prescription labels, select the type of prescription container, and affix the prescription and auxiliary labels to the container. Once the prescription is filled, technicians price and file the prescription, which must be checked by a pharmacist before it is given to a patient. Technicians may establish and maintain patient profiles, prepare insurance claim forms, and stock and take inventory of prescription and over-the-counter medications.



*Pharmacy technicians help to ensure that patients get necessary medication.*

In hospitals, technicians have added responsibilities. They read patient charts and prepare and deliver the medicine to patients. The pharmacist must check the order before it is delivered to the patient. The technician then copies the information about the prescribed medication onto the patient's profile. Technicians also may assemble a 24-hour supply of medicine for every patient. They package and label each dose separately. The package is then placed in the medicine cabinet of each patient until the supervising pharmacist checks it for accuracy. It is then given to the patient.

## Working Conditions

Pharmacy technicians work in clean, organized, well-lighted, and well-ventilated areas. Most of their workday is spent on their feet. They may be required to lift heavy boxes or to use stepladders to retrieve supplies from high shelves.

Technicians work the same hours as pharmacists. This may include evenings, nights, weekends, and holidays. Because some hospital and retail pharmacies are open 24 hours a day, technicians may work varying shifts. As their seniority increases, technicians often have increased control over the hours they work. There are many opportunities for part-time work in both retail and hospital settings.

## Employment

Pharmacy technicians held about 190,000 jobs in 2000. Two-thirds of all jobs were in retail pharmacies, either independently owned or part of a drug store chain, grocery store, department store, or mass retailer. More than 2 out of 10 jobs were in hospitals and a small number were in mail-order and Internet pharmacies, clinics, pharmaceutical wholesalers, and the Federal Government.

## Training, Other Qualifications, and Advancement

Although most pharmacy technicians receive informal on-the-job training, employers favor those who have completed formal training and certification. However, there are currently few State and no Federal requirements for formal training or certification of pharmacy technicians. Employers who can neither afford, nor have the time to give, on-the-job training often seek formally educated pharmacy technicians. Formal education programs and certification emphasize the technicians' interest in and dedication to the work to potential employers. In addition to the military, some hospitals, proprietary schools, vocational or technical colleges, and community colleges offer formal education programs.

Formal pharmacy-technician education programs require classroom and laboratory work in a variety of areas, including medical

and pharmaceutical terminology, pharmaceutical calculations, pharmacy recordkeeping, pharmaceutical techniques, and pharmacy law and ethics. Technicians also are required to learn medication names, actions, uses, and doses. Many training programs include internships, in which students gain hands-on experience in actual pharmacies. Students receive a diploma, certificate, or an associate degree, depending on the program.

Prospective pharmacy technicians with experience working as an aide in a community pharmacy or volunteering in a hospital may have an advantage. Employers also prefer applicants with strong customer service and communication skills and with experience managing inventories, counting, measuring, and using computers. Technicians entering the field need strong mathematics, spelling, and reading skills. A background in chemistry, English, and health education also may be beneficial. Some technicians are hired without formal training, but under the condition that they obtain certification within a specified period to retain employment.

The Pharmacy Technician Certification Board administers the National Pharmacy Technician Certification Examination. This exam is voluntary and displays the competency of the individual to act as a pharmacy technician. Eligible candidates must have a high school diploma or GED, and those who pass the exam earn the title of Certified Pharmacy Technician (CPhT). The exam is offered several times per year at various locations nationally. Employers, often pharmacists, know that individuals who pass the exam have a standardized body of knowledge and skills.

Certified technicians must be recertified every 2 years. Technicians must complete 20 contact hours of pharmacy-related topics within the 2-year certification period to become eligible for recertification. Contact hours are awarded for on-the-job training, attending lectures, and college coursework. At least 1 contact hour must be in pharmacy law. Contact hours can be earned from several different sources, including pharmacy associations, pharmacy colleges, and pharmacy technician training programs. Up to 10 contact hours can be earned when the technician is employed under the direct supervision and instruction of a pharmacist.

Successful pharmacy technicians are alert, observant, organized, dedicated, and responsible. They should be willing and able to take directions. They must enjoy precise work—details are sometimes a matter of life and death. Although a pharmacist must check and approve all their work, they should be able to work on their own without constant instruction from the pharmacist. Candidates interested in becoming pharmacy technicians cannot have prior records of drug or substance abuse.

Strong interpersonal and communication skills are needed because there is a lot of interaction with patients, coworkers, and healthcare professionals. Teamwork is very important because technicians are often required to work with pharmacists, aides, and other technicians.

**Job Outlook**

Good job opportunities are expected for full-time and part-time work, especially for technicians with formal training or previous experience. Job openings for pharmacy technicians will result from the expansion of retail pharmacies and other employment settings, and from the need to replace workers who transfer to other occupations or leave the labor force.

Employment of pharmacy technicians is expected to grow much faster than the average for all occupations through 2010 due to the increased pharmaceutical needs of a larger and older population, and to the greater use of medication. The increased number of middle-aged and elderly people—who, on average, use more prescription drugs than do younger people—will spur demand for technicians in all practice settings. With advances in science, more medications are becoming available to treat more conditions.

Cost-conscious insurers, pharmacies, and health systems will continue to emphasize the role of technicians. As a result, pharmacy technicians will assume responsibility for more routine tasks previously performed by pharmacists. Pharmacy technicians also will need to learn and master new pharmacy technology as it surfaces. For example, robotic machines are used to dispense medicine into containers; technicians must oversee the machines, stock the bins, and label the containers. Thus, while automation is increasingly incorporated into the job, it will not necessarily reduce the need for technicians.

Almost all States have legislated the maximum number of technicians who can safely work under a pharmacist at a time. In some States, increased demand for technicians has encouraged an expanded ratio of technicians to pharmacists. Changes in these laws could directly affect employment.

**Earnings**

Median hourly earnings of pharmacy technicians in 2000 were \$9.93. The middle 50 percent earned between \$8.12 and \$12.26; the lowest 10 percent earned less than \$7.00, and the highest 10 percent earned more than \$14.56. Median hourly earnings in the industries employing the largest numbers of pharmacy technicians in 2000 were as follows:

Hospitals .....	\$11.44
Grocery stores .....	10.57
Drugs, proprietaries, and sundries .....	10.09
Drug stores and proprietary stores .....	9.00
Department stores .....	8.75

Certified technicians may earn more. Shift differentials for working evenings or weekends also can increase earnings. Some technicians belong to unions representing hospital or grocery store workers.

**Related Occupations**

This occupation is most closely related to pharmacists and pharmacy aides. Workers in other medical support occupations include dental assistants, licensed practical and licensed vocational nurses, medical transcriptionists, medical records and health information technicians, occupational therapist assistants and aides, physical therapist assistants and aides, secretaries and administrative assistants, and surgical technologists.

**Sources of Additional Information**

For information on certification and a National Pharmacy Technician Certification Examination Candidate Handbook, contact:  
➤ Pharmacy Technician Certification Board, 2215 Constitution Ave. NW., Washington DC 20037. Internet: <http://www.ptcb.org>

---

## Physical Therapist Assistants and Aides

---

(O\*NET 31-2021.00, 31-2022.00)

**Significant Points**

- Employment is projected to increase much faster than the average, as rapid growth in the number of middle-aged and elderly individuals increases the demand for therapeutic services.
- Licensed physical therapist assistants have an associate’s degree, but physical therapist aides usually learn skills on the job.
- More than two-thirds of jobs for physical therapist assistants and aides were in hospitals or offices of physical therapists.

## Nature of the Work

Physical therapist assistants and aides perform components of physical therapy procedures and related tasks selected by a supervising physical therapist. These workers assist physical therapists in providing services that help improve mobility, relieve pain, and prevent or limit permanent physical disabilities of patients suffering from injuries or disease. Patients include accident victims and individuals with disabling conditions, such as low back pain, arthritis, heart disease, fractures, head injuries, and cerebral palsy.

*Physical therapist assistants* perform a variety of tasks. Components of treatment procedures performed by these workers, under the direction and supervision of physical therapists, involve exercises, massages, electrical stimulation, paraffin baths, hot and cold packs, traction, and ultrasound. Physical therapist assistants record the patient's responses to treatment and report to the physical therapist the outcome of each treatment.

*Physical therapist aides* help make therapy sessions productive, under the direct supervision of a physical therapist or physical therapist assistant. They usually are responsible for keeping the treatment area clean and organized and preparing for each patient's therapy. When patients need assistance moving to or from a treatment area, aides push them in a wheelchair, or provide them with a shoulder to lean on. Because they are not licensed, aides do not perform the clinical tasks of a physical therapist assistant.

The duties of aides include some clerical tasks, such as ordering depleted supplies, answering the phone, and filling out insurance forms and other paperwork. The extent to which an aide or an assistant performs clerical tasks depends on the size and location of the facility.

## Working Conditions

The hours and days that physical therapist assistants and aides work vary, depending on the facility and on whether they are full or part-time employees. Many outpatient physical therapy offices and clinics have evening and weekend hours, to help coincide with patients' personal schedules.



*Physical therapist assistants help patients with stretching exercises during treatment.*

Physical therapist assistants and aides need to have a moderate degree of strength, due to the physical exertion required in assisting patients with their treatment. For example, in some cases, assistants and aides need to help lift patients. Additionally, constant kneeling, stooping, and standing for long periods are all part of the job.

## Employment

Physical therapist assistants and aides held 80,000 jobs in 2000. Physical therapist assistants held about 44,000 jobs; and physical therapist aides held about 36,000. They work alongside physical therapists in a variety of settings. More than two-thirds of jobs for assistants and aides were in hospitals or offices of physical therapists. Others work in nursing and personal care facilities, outpatient rehabilitation centers, offices and clinics of physicians, and home health agencies.

## Training, Other Qualifications, and Advancement

Physical therapist aides are trained on the job, but physical therapist assistants typically earn an associate's degree from an accredited physical therapist assistant program. Licensure or registration is not required in all States for the physical therapist assistant to practice. The States that require licensure stipulate specific educational and examination criteria. Complete information on practice acts and regulations can be obtained from the State licensing boards. Additional requirements may include certification in CPR and other first aid and a minimum number of hours of clinical experience.

According to the American Physical Therapy Association, there were 268 accredited physical therapist assistant programs in the United States as of 2001. Accredited physical therapist assistant programs are designed to last 2 years, or 4 semesters, and culminate in an associate's degree. Programs are divided into academic study and hands on clinical experience. Academic coursework includes algebra, anatomy and physiology, biology, chemistry, and psychology. Before students begin their clinical field experience, many programs require that they complete a semester of anatomy and physiology and have certifications in CPR and other first aid. Both educators and prospective employers view clinical experience as an integral part of ensuring that students understand the responsibilities of a physical therapist assistant.

Employers typically require physical therapist aides to have a high school diploma, strong interpersonal skills, and a desire to assist people in need. Most employers provide clinical on-the-job training.

## Job Outlook

Employment of physical therapist assistants and aides is expected to grow much faster than the average through the year 2010. Federal legislation imposing limits on reimbursement for therapy services may adversely affect the job market for physical therapist assistants and aides in the near term. However, over the long run, demand for physical therapist assistants and aides will continue to rise, with growth in the number of individuals with disabilities or limited function. The rapidly growing elderly population is particularly vulnerable to chronic and debilitating conditions that require therapeutic services. These patients often need additional assistance in their treatment, making the roles of assistants and aides vital. The large baby-boom generation is entering the prime age for heart attacks and strokes, further increasing the demand for cardiac and physical rehabilitation. Additionally, future medical developments should permit an increased percentage of trauma victims to survive, creating added demand for therapy services.

Licensed physical therapist assistants can enhance the cost-effective provision of physical therapy services. Once a patient is

evaluated, and a treatment plan is designed by the physical therapist, the physical therapist assistant can provide many aspects of treatment, as prescribed by the therapist.

### Earnings

Median annual earnings of physical therapist assistants were \$33,870 in 2000. The middle 50 percent earned between \$28,830 and \$40,440. The lowest 10 percent earned less than \$23,150, and the highest 10 percent earned more than \$45,610. Median annual earnings of physical therapist assistants in 2000 were \$33,660 in offices of other healthcare practitioners and \$33,820 in hospitals.

Median annual earnings of physical therapist aides were \$19,670 in 2000. The middle 50 percent earned between \$16,460 and \$23,390. The lowest 10 percent earned less than \$14,590, and the highest 10 percent earned more than \$28,800. Median annual earnings of physical therapist aides in 2000 were \$18,320 in offices of other healthcare practitioners and \$19,840 in hospitals.

### Related Occupations

Physical therapist assistants and aides work under the supervision of physical therapists. Other occupations in the healthcare field that work under the supervision of professionals include dental assistants, medical assistants, occupational therapist assistants and aides, and pharmacy technicians.

### Sources of Additional Information

Information on a career as a physical therapist assistant and a list of schools offering accredited programs can be obtained from:

► The American Physical Therapy Association, 1111 North Fairfax St., Alexandria, VA 22314-1488. Internet: <http://www.apta.org>

---

## Radiologic Technologists and Technicians

---

(O\*NET 29-2034.01, 29-2034.02)

---

### Significant Points

- Faster-than-average growth will arise from an increase in the number of middle-aged and older persons who are the primary users of diagnostic procedures
- Although hospitals will remain the primary employer of radiologic technologists and technicians, a greater number of new jobs will be found in offices and clinics of physicians, including diagnostic imaging centers.
- Radiologic technologists and technicians with cross training in nuclear medicine technology or other modalities will have the best prospects.

### Nature of the Work

Radiologic technologists and technicians take x rays and administer nonradioactive materials into patients' blood streams for diagnostic purposes. Some specialize in diagnostic imaging technologies such as computed tomography (CT) and magnetic resonance imaging (MRI).

In addition to radiologic technologists and technicians, others who assist in diagnostic imaging procedures include cardiovascular technologists and technicians, diagnostic medical sonographers, and nuclear medicine technologists. (Each is discussed elsewhere in the *Handbook*.)



*A radiologic technologist positions an x-ray machine at the correct angle and height over the appropriate area of a patient's body.*

Radiologic technologists and technicians, also referred to as *radiographers*, produce x-ray films (radiographs) of parts of the human body for use in diagnosing medical problems. They prepare patients for radiologic examinations by explaining the procedure, removing articles such as jewelry, through which x rays cannot pass, and positioning patients so that the parts of the body can be appropriately radiographed. To prevent unnecessary radiation exposure, they surround the exposed area with radiation protection devices, such as lead shields, or limit the size of the x-ray beam. Radiographers position radiographic equipment at the correct angle and height over the appropriate area of a patient's body. Using instruments similar to a measuring tape, they may measure the thickness of the section to be radiographed and set controls on the x-ray machine to produce radiographs of the appropriate density, detail, and contrast. They place the x-ray film under the part of the patient's body to be examined and make the exposure. They then remove the film and develop it.

Experienced radiographers may perform more complex imaging procedures. For fluoroscopies, radiographers prepare a solution of contrast medium for the patient to drink, allowing the radiologist, a physician who interprets radiographs, to see soft tissues in the body. Some radiographers, called *CT technologists*, operate computerized tomography scanners to produce cross sectional images of patients. Others operate machines using strong magnets and radio waves rather than radiation to create an image and are called *magnetic resonance imaging (MRI) technologists*.

Radiologic technologists and technicians must follow physicians' orders precisely and conform to regulations concerning use of radiation to protect themselves, their patients, and coworkers from unnecessary exposure.

In addition to preparing patients and operating equipment, radiologic technologists and technicians keep patient records and adjust and maintain equipment. They also may prepare work schedules, evaluate equipment purchases, or manage a radiology department.

### Working Conditions

Most full-time radiologic technologists and technicians work about 40 hours a week; they may have evening, weekend, or on-call hours. Opportunities for part-time and shift work are also available.

Because technologists and technicians are on their feet for long periods and may lift or turn disabled patients, physical stamina is important. Technologists and technicians work at diagnostic machines but may also do some procedures at patients' bedsides. Some



travel to patients in large vans equipped with sophisticated diagnostic equipment.

Although potential radiation hazards exist in this occupation, they are minimized by the use of lead aprons, gloves, and other shielding devices, as well as by instruments monitoring radiation exposure. Technologists and technicians wear badges measuring radiation levels in the radiation area, and detailed records are kept on their cumulative lifetime dose.

### Employment

Radiologic technologists and technicians held about 167,000 jobs in 2000. About 1 in 5 worked part time. More than half of all jobs are in hospitals. Most of the rest are in physicians' offices and clinics, including diagnostic imaging centers.

### Training, Other Qualifications, and Advancement

Preparation for this profession is offered in hospitals, colleges and universities, vocational-technical institutes, and the U.S. Armed Forces. Hospitals, which employ most radiologic technologists and technicians, prefer to hire those with formal training.

Formal training programs in radiography range in length from 1 to 4 years and lead to a certificate, associate's degree, or bachelor's degree. Two-year associate's degree programs are most prevalent.

Some 1-year certificate programs are available for experienced radiographers or individuals from other health occupations, such as medical technologists and registered nurses, who want to change fields or specialize in computerized tomography or magnetic resonance imaging. A bachelor's or master's degree in one of the radiologic technologies is desirable for supervisory, administrative, or teaching positions.

The Joint Review Committee on Education in Radiologic Technology accredits most formal training programs for this field. They accredited 584 radiography programs in 2000. Radiography programs require, at a minimum, a high school diploma or the equivalent. High school courses in mathematics, physics, chemistry, and biology are helpful. The programs provide both classroom and clinical instruction in anatomy and physiology, patient care procedures, radiation physics, radiation protection, principles of imaging, medical terminology, positioning of patients, medical ethics, radiobiology, and pathology.

In 1981, Congress passed the Consumer-Patient Radiation Health and Safety Act, which aims to protect the public from the hazards of unnecessary exposure to medical and dental radiation by ensuring operators of radiologic equipment are properly trained. Under the act, the Federal Government sets voluntary standards that the States, in turn, may use for accrediting training programs and certifying individuals who engage in medical or dental radiography.

In 1999, 35 States and Puerto Rico licensed radiologic technologists and technicians. Voluntary registration is offered by the American Registry of Radiologic Technologists (ARRT) in radiography. To be eligible for registration, technologists generally must graduate from an accredited program and pass an examination. Many employers prefer to hire registered radiographers. To be recertified, radiographers must complete 24 hours of continuing education every other year.

Radiologic technologists and technicians should be sensitive to patients' physical and psychological needs. They must pay attention to detail, follow instructions, and work as part of a team. In addition, operating complicated equipment requires mechanical ability and manual dexterity.

With experience and additional training, staff technologists may become specialists, performing CT scanning, angiography, and magnetic resonance imaging. Experienced technologists may also

be promoted to supervisor, chief radiologic technologist, and—ultimately—department administrator or director. Depending on the institution, courses or a master's degree in business or health administration may be necessary for the director's position. Some technologists progress by becoming instructors or directors in radiologic technology programs; others take jobs as sales representatives or instructors with equipment manufacturers.

### Job Outlook

Employment of radiologic technologists and technicians is expected to grow faster than the average for all occupations through 2010, as the population grows and ages, increasing the demand for diagnostic imaging. Opportunities are expected to be favorable. Some employers report shortages of radiologic technologists and technicians. Imbalances between the supply of qualified workers and demand should spur efforts to attract and retain qualified radiologic technologists and technicians. For example, employers may provide more flexible training programs, or improve compensation and working conditions.

Although physicians are enthusiastic about the clinical benefits of new technologies, the extent to which they are adopted depends largely on cost and reimbursement considerations. For example, digital imaging technology can improve quality and efficiency, but remains expensive. Some promising new technologies may not come into widespread use because they are too expensive and third-party payers may not be willing to pay for their use.

Radiologic technologists who are educated and credentialed in more than one type of diagnostic imaging technology, such as radiography and sonography or nuclear medicine, will have better employment opportunities as employers look for new ways to control costs. In hospitals, multi-skilled employees will be the most sought after, as hospitals respond to cost pressures by continuing to merge departments.

Hospitals will remain the principal employer of radiologic technologists and technicians. However, a greater number of new jobs will be found in offices and clinics of physicians, including diagnostic imaging centers. Health facilities such as these are expected to grow very rapidly through 2010 due to the strong shift toward outpatient care, encouraged by third-party payers and made possible by technological advances that permit more procedures to be performed outside the hospital. Some job openings will also arise from the need to replace technologists and technicians who leave the occupation.

### Earnings

Median annual earnings of radiologic technologists and technicians were \$36,000 in 2000. The middle 50 percent earned between \$30,220 and \$43,380. The lowest 10 percent earned less than \$25,310, and the highest 10 percent earned more than \$52,050. Median annual earnings in the industries employing the largest numbers of radiologic technologists and technicians in 2000 were:

Medical and dental laboratories .....	\$39,400
Hospitals .....	36,280
Offices and clinics of medical doctors .....	34,870

### Related Occupations

Radiologic technologists and technicians operate sophisticated equipment to help physicians, dentists, and other health practitioners diagnose and treat patients. Workers in related occupations include cardiovascular technologists and technicians, clinical laboratory technologists and technicians, diagnostic medical sonographers, nuclear medicine technologists, radiation therapists, and respiratory therapists.

## Sources of Additional Information

For career information, send a stamped, self-addressed business size envelope with your request to:

➤ American Society of Radiologic Technologists, 15000 Central Ave. SE., Albuquerque, NM 87123-3917. Internet: <http://www.asrt.org/asrt.htm>

For the current list of accredited education programs in radiography, write to:

➤ Joint Review Committee on Education in Radiologic Technology, 20 N. Wacker Dr., Suite 600, Chicago, IL 60606-2901. Internet:

<http://www.jrcert.org>

For information on certification, contact:

➤ American Registry of Radiologic Technologists, 1255 Northland Dr., St. Paul, MN 55120-1155. Internet: <http://www.arrt.org>

## Surgical Technologists

(O\*NET 29-2055.00)

### Significant Points

- Most educational programs for surgical technologists last approximately 1 year and result in a certificate.
- Employment of surgical technologists is expected to grow faster than average as the number of surgical procedures grows.

### Nature of the Work

Surgical technologists, also called *scrubs* and *surgical or operating room technicians*, assist in surgical operations under the supervision of surgeons, registered nurses, or other surgical personnel. Surgical technologists are members of operating room teams, which most commonly include surgeons, anesthesiologists, and circulating nurses. Before an operation, surgical technologists help prepare the operating room by setting up surgical instruments and equipment, sterile drapes, and sterile solutions. They assemble both sterile and nonsterile equipment, as well as adjust and check it to ensure it is working properly. Technologists also get patients ready for surgery by washing, shaving, and disinfecting incision sites. They transport patients to the operating room, help position them on the operating table, and cover them with sterile surgical “drapes.” Technologists also observe patients’ vital signs, check charts, and assist the surgical team with putting on sterile gowns and gloves.



*Surgical technologists prepare operating rooms and assist surgical personnel during operations.*

During surgery, technologists pass instruments and other sterile supplies to surgeons and surgeon assistants. They may hold retractors, cut sutures, and help count sponges, needles, supplies, and instruments. Surgical technologists help prepare, care for, and dispose of specimens taken for laboratory analysis and help apply dressings. Some operate sterilizers, lights, or suction machines, and help operate diagnostic equipment.

After an operation, surgical technologists may help transfer patients to the recovery room and clean and restock the operating room.

### Working Conditions

Surgical technologists work in clean, well-lighted, cool environments. They must stand for long periods and remain alert during operations. At times they may be exposed to communicable diseases and unpleasant sights, odors, and materials.

Most surgical technologists work a regular 40-hour week, although they may be on call or work nights, weekends and holidays on a rotating basis.

### Employment

Surgical technologists held about 71,000 jobs in 2000. Almost three-quarters are employed by hospitals, mainly in operating and delivery rooms. Others are employed in clinics and surgical centers, and in the offices of physicians and dentists who perform outpatient surgery. A few, known as private scrubs, are employed directly by surgeons who have special surgical teams, like those for liver transplants.

### Training, Other Qualifications, and Advancement

Surgical technologists receive their training in formal programs offered by community and junior colleges, vocational schools, universities, hospitals, and the military. In 2001, the Commission on Accreditation of Allied Health Education Programs (CAAHEP) recognized 350 accredited programs. High school graduation normally is required for admission. Programs last 9 to 24 months and lead to a certificate, diploma, or associate degree.

Programs provide classroom education and supervised clinical experience. Students take courses in anatomy, physiology, microbiology, pharmacology, professional ethics, and medical terminology. Other studies cover the care and safety of patients during surgery, aseptic techniques, and surgical procedures. Students also learn to sterilize instruments; prevent and control infection; and handle special drugs, solutions, supplies, and equipment.

Technologists may obtain voluntary professional certification from the Liaison Council on Certification for the Surgical Technologist by graduating from a CAAHEP-accredited program and passing a national certification examination. They may then use the designation Certified Surgical Technologist, or CST. Continuing education or reexamination is required to maintain certification, which must be renewed every 6 years. Certification may also be obtained from the National Center for Competency Testing. To qualify to take the exam, candidates follow one of three paths: complete an accredited training program, undergo a 2-year hospital on-the-job training program, or acquire seven years experience working in the field. After passing the exam, individuals may use the designation National Certified Technician O.R. This certification may be renewed every 5 years through either continuing education or reexamination. Most employers prefer to hire certified technologists.

Surgical technologists need manual dexterity to handle instruments quickly. They also must be conscientious, orderly, and emotionally stable to handle the demands of the operating room environment. Technologists must respond quickly and know procedures well to have instruments ready for surgeons without having to be told. They are expected to keep abreast of new developments in the field. Recommended high school courses include health, biology, chemistry, and mathematics.

Technologists advance by specializing in a particular area of surgery, such as neurosurgery or open heart surgery. They also may work as circulating technologists. A circulating technologist is the “unsterile” member of the surgical team who prepares patients; helps with anesthesia; obtains and opens packages for the “sterile” persons to remove the sterile contents during the procedure; interviews the patient before surgery; keeps a written account of the surgical procedure; and answers the surgeon’s questions about the patient during the surgery. With additional training, some technologists advance to first assistants, who help with retracting, sponging, suturing, cauterizing bleeders, and closing and treating wounds. Some surgical technologists manage central supply departments in hospitals, or take positions with insurance companies, sterile supply services, and operating equipment firms.

### **Job Outlook**

Employment of surgical technologists is expected to grow faster than the average for all occupations through the year 2010 as the volume of surgery increases. The number of surgical procedures is expected to rise as the population grows and ages. As the “baby boom” generation enters retirement age, the over 50 population will account for a larger portion of the general population. Older people require more surgical procedures. Technological advances, such as fiber optics and laser technology, will also permit new surgical procedures to be performed.

Hospitals will continue to be the primary employer of surgical technologists, although much faster employment growth is expected in offices and clinics of physicians, including ambulatory surgical centers.

### **Earnings**

Median annual earnings of surgical technologists were \$29,020 in 2000. The middle 50 percent earned between \$24,490 and \$34,160. The lowest 10 percent earned less than \$20,490, and the highest 10 percent earned more than \$40,310. Median annual earnings of surgical technologists in 2000 were \$31,190 in offices and clinics of medical doctors and \$28,340 in hospitals.

### **Related Occupations**

Other health occupations requiring approximately 1 year of training after high school include dental assistants, licensed practical and licensed vocational nurses, medical and clinical laboratory technicians, medical assistants, and respiratory therapy technicians.

### **Sources of Additional Information**

For additional information on a career as a surgical technologist and a list of CAAHEP-accredited programs, contact:

► Association of Surgical Technologists, 7108-C South Alton Way, Englewood, CO 80112. Internet: <http://www.ast.org>

For information on becoming a Certified Surgical Technologist, contact:

► Liaison Council on Certification for the Surgical Technologist, 7790 East Arapahoe Rd., Suite 240, Englewood, CO 80112-1274. Internet: [http://www.lcc-st.org/index\\_ie.htm](http://www.lcc-st.org/index_ie.htm)

For information on becoming a National Certified Technician O.R., contact:

► National Center for Competency Testing, 7007 College Blvd., Suite 250, Overland Park, KS 6621. Internet: <http://www.ncctinc.com>